CISCO SYSTEMS

Cisco MGX 8850 (PXM45) and MGX 8950 Software Configuration Guide

Release 3
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About This Guide

This preface describes the objectives, audience, organization, and conventions of the *Cisco MGX 8850 (PXM45) and MGX 8950 Software Configuration Guide*.

Objectives

This guide describes how to configure the MGX 8850 and the MGX 8950 switch software and how to perform some operating procedures after the switch begins operation.

Audience

The *Cisco MGX 8850 (PXM45) and MGX 8950 Software Configuration Guide* provides network operators and administrators with information to set up the MGX 8850 switches to run Release 2.1 software.

Organization

The major sections of this document are as follows:

- Chapter 1, “Preparing for Configuration,” describes information you will need during configuration and provides planning guidelines for configuration.
- Chapter 2, “Configuring General Switch Features,” describes how to configure features that apply to the entire switch, rather than to a single card, line, or trunk.
- Chapter 3, “Preparing AXSM Cards and Lines for Communication,” describes how to configure AXSM cards, card and line redundancy, and individual lines.
- Chapter 5, “Preparing RPM-PR Cards for Operation,” describes how to initialize RPM-PR cards in the switch.
- Chapter 6, “Managing PNNI Nodes and PNNI Routing,” provides information you can use to optimize PNNI routing.
- Chapter 7, “Switch Operating Procedures,” describes how to manage your configuration after the switch is configured and during day-to-day operation.
- Chapter 8, “Switch Maintenance Procedures,” provides procedures for adding and replacing cards after the initial installation and configuration of the switch.

- Chapter 9, "Viewing and Responding to Alarms," describes the controls available on the switch and how to view switch alarms.
- Appendix A, "Downloading and Installing Software Upgrades," explains how to upgrade switch software.
- Appendix B, "PXM45 Backup Boot Procedures," describes special procedures you can use to manage the switch when only the boot software is loaded.
- Appendix C, "Supporting and Using Additional CLI Access Options,"describes alternative ways to connect management workstations to the switch.

Related Documentation

The following Cisco publications contain additional information related to the operation of this product and associated equipment in a Cisco WAN switching network.

Cisco WAN Manager Release 11

The product documentation for the Cisco WAN Manager (CWM) network management system for Release 11 is listed in Table 1.

Table 1 Cisco WAN Manager Release 11 Documentation

Title	Description
Cisco WAN Manager Installation Guide for Solaris 7, Release 11 DOC-7813567=	Provides procedures for installing Release 11 of the CWM network management system and Release 5.4 of CiscoView on a Solaris 7 platform.
Cisco WAN Manager Installation Guide for Solaris 8, Release 11 DOC-7814230=	Provides procedures for installing Release 11 of the CWM network management system and Release 5.4 of CiscoView on a Solaris 8 platform.
Cisco WAN Manager User's Guide, Release 11 DOC-7813568=	Describes how to use the CWM Release 11 software, which consists of user applications and tools for network management, connection management, network configuration, statistics collection, and security management.
Cisco WAN Manager SNMP Service Agent, Release 11 DOC-7813569=	Provides information about the CWM Simple Network Management Protocol Service Agent, an optional adjunct to CWM that is used for managing Cisco WAN switches using SNMP.
Cisco WAN Manager Database Interface Guide, Release 11 DOC-7813542=	Provides information about accessing the CWM Informix OnLine database that is used to store information about the network elements.

Table 2 WAN CiscoView Release 11 Documentation

Title	Description
WAN CiscoView Release 3 for the MGX 8850 Edge Switch, Release 1 DOC-7811242=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks.
WAN CiscoView Release 3 for the MGX 8250 Edge Concentrator, Release 1 DOC-7811241=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks.
WAN CiscoView Release 3 for the MGX 8230 Multiservice Gateway, Release 1 DOC-7810926=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks.

Cisco MGX 8850 (PXM45) Multiservice Switch Release 3

The product documentation for the installation and operation of the Cisco MGX 8850 (PXM45) Multiservice Switch Release 3 is listed in Table 3.

Table 3 Cisco MGX 8850 (PXM45) Release 3 Documentation

Title	Description
Cisco MGX 8850 (PXM45 and PXM1E) Hardware Installation Guide, Release 3 DOC-7814250=	Describes how to install the Cisco MGX 8850 multiservice switch. This guide explains what the switch does and covers site preparation, grounding, safety, card installation, and cabling. The Cisco MGX 8850 switch uses either a PXM45 or a PXM1E controller card and provides support for both broadband and narrow band service modules.
Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Command Reference, Release 3 DOC-7814789=	Describes the PXM commands that are available on the CLI[1] of the Cisco MGX 8830, Cisco MGX 8850, and Cisco MGX 8950 switches.
Cisco MGX 8850 (PXM45) and MGX 8950 Software Configuration Guide, Release 3 DOC-7814788=	Describes how to configure the Cisco MGX 8850 (PXM45) and the Cisco MGX 8950 switches with a PXM45 controller to operate as ATM edge or core switches. This guide also provides some operation and maintenance procedures.
Cisco SNMP Reference for MGX 8850 (PXM45 and PXM1E), MGX 8950, and MGX 8830, Release 3 DOC-7814747=	Provides information on all supported MIB[2] objects, support restrictions, and traps for AXSM, AXSM-E, SRM-3T3, SRME, FRSM12, PXM45, PXM1E, RPM-PR, and RPM-XF.
Cisco Frame Relay Software Configuration Guide and Command Reference for the MGX 8850 FRSM12 Card, Release 3 DOC-7810327=	Describes how to use the high-speed Frame Relay (FRSM-12-T3E3) commands that are available in the CLI of the Cisco MGX 8850 (PXM45) switch.
Cisco AXSM Software Configuration Guide and Command Reference for MGX 8850 (PXM45) and MGX 8950, Release 3 DOC-7814257=	This guide explains how to configure the AXSM cards for operation and a command reference that describes the AXSM commands in detail. The AXSM cards covered in this manual are the AXSM/A, AXSM/B, AXSM-E, and AXSM-32-T1E1-E.

Table 3 Cisco MGX 8850 (PXM45) Release 3 Documentation (continued)

Title	Description
Cisco MGX and SES PNNI Network Planning Guide DOC-7813543=	Provides guidelines for planning a PNNI network that uses the Cisco MGX 8850 (PXM45 and PXM1E), Cisco MGX 8950, and the Cisco BPX 8600 switches. When connected to a PNNI network, each Cisco BPX 8600 series switch requires an SES[3] for PNNI route processing.
Cisco MGX Route Processor Module (RPM-XF) Installation and Configuration Guide, Release 3 OL-2768-01 (online only)	Describes how to install and configure the Cisco MGX Route Processor Module (RPM-XF) in the Cisco MGX 8850 Release 3 switch. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Cisco VISM Installation and Configuration Guide, Release 3 OL-2521-01	Describes how to install and configure VISM[4] in the Cisco MGX 8850, Cisco MGX 8250, and Cisco MGX 8230 Release 3 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.
Release Notes for Cisco Voice Interworking Service Module Release 3.1 OL-2785-01	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.
Regulatory Compliance and Safety Information for the Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Switches DOC-7814790=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco MGX 8830, Cisco MGX 8850 (PXM45 and PXM1E), and Cisco MGX 8950 switches.

1. CLI = command line interface
2. MIB = Management Information Base
3. SES = Service Expansion Shelf
4. VISM = Voice Interworking Service Module

Cisco MGX 8850 (PXM1E) Multiservice Switch Release 3

The product documentation for the installation and operation of the Cisco MGX 8850 (PXM1E) Multiservice Switch Release 3 is listed in Table 4.

Table 4 Cisco MGX 8850 (PXM1E) Release 3 Documentation

Title	Description
Cisco MGX 8850 (PXM45 and PXM1E) Hardware Installation Guide, Release 3 DOC-7814250=	Describes how to install the Cisco MGX 8850 routing switch. This documentation explains what the switch does and covers site preparation, grounding, safety, card installation, and cabling. The Cisco MGX 8850 switch uses either a PXM45 or a PXM1E controller card and provides support for both broadband and narrow band service modules.
Cisco MGX 8850 (PXM1E) and MGX 8830 Software Configuration Guide, Release 3 DOC-7814248=	Describes how to configure the Cisco MGX 8850 (PXM1E) and the Cisco MGX 8830 switches with PXM1E controller cards to operate as ATM edge switches. This guide also provides some operation and maintenance procedures.

Table 4 Cisco MGX 8850 (PXM1E) Release 3 Documentation (continued)

Title	Description
Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Command Reference, Release 3 DOC-7814789=	Describes the PXM commands that are available on the CLI of the Cisco MGX 8830, Cisco MGX 8850, and Cisco MGX 8950 switches.
Cisco SNMP Reference for MGX 8850 (PXM45 and PXM1E), MGX 8950, and MGX 8830, Release 3 DOC-7814747=	Provides information on all supported MIB objects, support restrictions, and traps for AXSM, AXSM-E, SRM-3T3, SRME, FRSM12, PXM45, PXM1E, RPM-PR, and RPM-XF.
Cisco Frame Relay Software Configuration Guide and Command Reference for MGX Switches (PXM1E) DOC-7814255=	Provides software configuration procedures for provisioning connections and managing the FRSM cards supported in this release. Also provides command descriptions for all FRSM commands.
Cisco AUSM Software Configuration Guide and Command Reference for MGX 8850 (PXM1E) and MGX 8830, Release 3 DOC-7814254=	Provides software configuration procedures for provisioning connections and managing the AUSM cards supported in this release. Also provides command descriptions for all AUSM commands.
Cisco CESM Software Configuration Guide and Command Reference for MGX 8850 (PXM1E) and MGX 8830, Release 3 DOC-7814256=	Provides software configuration procedures for provisioning connections and managing the CESM cards supported in this release. Also provides command descriptions for all CESM commands.
Cisco MGX and SES PNNI Network Planning Guide DOC-7813543=	Provides guidelines for planning a PNNI network that uses Cisco MGX 8850 (PXM45 and PXM1E), Cisco MGX 8950, and Cisco BPX 8600 switches. When connected to a PNNI network, each Cisco BPX 8600 series switch requires an SES for PNNI route processing.
Cisco MGX Route Processor Module (RPM-XF) Installation and Configuration Guide, Release 3 OL-2768-01 (online only)	Describes how to install and configure the Cisco MGX Route Processor Module (RPM-XF) in the Cisco MGX 8850 Release 3 switch. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01	Describes how to install and configure VISM in the Cisco MGX 8850, Cisco MGX 8250, and Cisco MGX 8230 Release 3 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.
Release Notes for Cisco Voice Interworking Service Module Release 3.1 OL-2785-01	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.
Regulatory Compliance and Safety Information for the Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Switches DOC-7814790=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco MGX 8830, Cisco MGX 8850 (PXM45 and PXM1E), and Cisco MGX 8950 switches.

Cisco MGX 8950 Multiservice Service Release 3

The product documentation for the installation and operation of the Cisco MGX 8950 Release 3 switch is listed in Table 5.

Table 5 Cisco MGX 8950 Switch Release 3 Documentation

Title	Description
Cisco MGX 8950 Hardware Installation Guide, Release 3 DOC-7814147=	Describes how to install the Cisco MGX 8950 core switch. This documentation explains what the switch does and covers site preparation, grounding, safety, card installation, and cabling. The Cisco MGX 8950 switch uses a PXM45/B controller card and provides support for broadband service modules.
Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Command Reference, Release 3 DOC-7814789=	Describes the PXM commands that are available on the CLI of the Cisco MGX 8830, Cisco MGX 8850, and Cisco MGX 8950 switches.
Cisco MGX 8850 (PXM45) and MGX 8950 Software Configuration Guide, Release 3 DOC-7814788=	Describes how to configure the Cisco MGX 8850 (PXM45) and the Cisco MGX 8950 switches with a PXM45 controller to operate as ATM edge or core switches. This guide also provides some operation and maintenance procedures.
Cisco AXSM Software Configuration Guide and Command Reference for MGX 8850 (PXM45) and MGX 8950, Release 3 DOC-7814257=	This guide explains how to configure the AXSM cards for operation and a command reference that describes the AXSM commands in detail. The AXSM cards covered in this manual are the AXSM/A, AXSM/B, AXSM-E, and AXSM-32-T1E1-E.
Cisco SNMP Reference for MGX 8850 (PXM45 and PXM1E), MGX 8950, and MGX 8830, Release 3 DOC-7814747=	Provides information on all supported MIB objects, support restrictions, and traps for AXSM, AXSM-E, SRM-3T3, SRME, FRSM12, PXM45, PXM1E, RPM-PR, and RPM-XF.
Cisco MGX and SES PNNI Network Planning Guide DOC-7813543=	Provides guidelines for planning a PNNI network that uses the Cisco MGX 8850 (PXM45 and PXM1E), Cisco MGX 8950, and the Cisco BPX 8600 switches. When connected to a PNNI network, each Cisco BPX 8600 series switch requires an SES for PNNI route processing.
Cisco MGX Route Processor Module (RPM-XF) Installation and Configuration Guide, Release 3 OL-2768-01 (online only)	Describes how to install and configure the Cisco MGX Route Processor Module (RPM-XF) in the Cisco MGX 8850 Release 3 switch. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Regulatory Compliance and Safety Information for the Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Switches DOC-7814790=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco MGX 8830, Cisco MGX 8850 (PXM45 and PXM1E), and Cisco MGX 8950 switches.

SES PNNI Release 3

The product documentation for the understanding, the installation, and the operation of the Service Expansion Shelf (SES) Private Network-to-Network Interface (PNNI) Controller is listed in Table 6.

Table 6 SES PNNI Controller Release 3 Documentation

Title	Description
Cisco SES PNNI Controller Software Configuration Guide, Release 3 DOC-7814258=	Describes how to configure, operate, and maintain the SES PNNI Controller.
Cisco SES PNNI Controller Command Reference, Release 3 DOC-7814260=	Provides a description of the commands used to configure and operate the SES PNNI Controller.
Cisco MGX and SES PNNI Network Planning Guide DOC-7813543=	Provides guidelines for planning a PNNI network that uses the Cisco MGX 8850 (PXM45 and PXM1E), Cisco MGX 8950, and the Cisco BPX 8600 switches. When connected to a PNNI network, each Cisco BPX 8600 series switch requires an SES for PNNI route processing.

Cisco MGX 8830 Multiservice Switch Release 3

The product documentation for the installation and operation of the Cisco MGX 8830 Release 3 switch is listed in Table 7.

Table 7 Cisco MGX 8830 Release 3 Documentation

Title	Description
Cisco MGX 8830 Hardware Installation Guide, Release 3 DOC-7814547=	Describes how to install the Cisco MGX 8830 edge switch. This documentation explains what the switch does and covers site preparation, grounding, safety, card installation, and cabling. The Cisco MGX 8830 switch uses a PXM1E controller card and provides PNNI support for narrow band service modules.
Cisco MGX 8850 (PXM1E) and MGX 8830 Software Configuration Guide, Release 3 DOC-7814248=	Describes how to configure the Cisco MGX 8850 (PXM1E) and the Cisco MGX 8830 switches with PXM1E controller cards to operate as ATM edge switches. This guide also provides some operation and maintenance procedures.
Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Command Reference, Release 3 DOC-7814789=	Describes the PXM commands that are available on the CLI of the Cisco MGX 8830, Cisco MGX 8850, and Cisco MGX 8950 switches.
Cisco SNMP Reference for MGX 8850 (PXM45 and PXM1E), MGX 8950, and MGX 8830, Release 3 DOC-7814747=	Provides information on all supported MIB objects, support restrictions, and traps for AXSM, AXSM-E, SRM-3T3, SRME, FRSM12, PXM45, PXM1E, RPM-PR, and RPM-XF.
Cisco AUSM Software Configuration Guide and Command Reference for MGX 8850 (PXM1E) and MGX 8830, Release 3 DOC-7814254=	Provides software configuration procedures for provisioning connections and managing the AUSM cards supported in this release. Also provides command descriptions for all AUSM commands.

Table 7 Cisco MGX 8830 Release 3 Documentation (continued)

Title	Description
Cisco CESM Software Configuration Guide and Command Reference for MGX 8850 (PXM1E) and MGX 8830, Release 3 DOC-7814256=	Provides software configuration procedures for provisioning connections and managing the CESM cards supported in this release. Also provides command descriptions for all CESM commands.
Cisco Frame Relay Software Configuration Guide and Command Reference for MGX Switches (PXM1E) DOC-7814255=	Provides software configuration procedures for provisioning connections and managing the FRSM cards supported in this release. Also provides command descriptions for all FRSM commands.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01	Describes how to install and configure VISM in the Cisco MGX 8850, Cisco MGX 8250, and Cisco MGX 8230 Release 3 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.
Release Notes for Cisco Voice Interworking Service Module Release 3.1 OL-2785-01	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.
Regulatory Compliance and Safety Information for the Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Switches DOC-7814790=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco MGX 8830, Cisco MGX 8850 (PXM45 and PXM1E), and Cisco MGX 8950 switches.

Cisco WAN Switching Software Release 9.3

The product documentation for the installation and operation of the Cisco WAN Switching Software Release 9.3 is listed in Table 8.

Table 8 Cisco WAN Switching Release 9.3 Documentation

Title	Description
Cisco BPX 8600 Series Installation and Configuration, Release 9.3.30 DOC-7812907=	Provides a general description and technical details of the Cisco BPX broadband switch.
Cisco WAN Switching Command Reference, Release 9.3.30 DOC-7812906=	Provides detailed information on the general command line interface commands.
Cisco IGX 8400 Series Installation Guide, Release 9.3.30 OL-1165-01 (online only)	Provides hardware installation and basic configuration information for Cisco IGX 8400 Series switches that are running Switch Software Release 9.3.30 or earlier.
Cisco IGX 8400 Series Provisioning Guide, Release 9.3.30 OL-1166-01 (online only)	Provides information for configuration and provisioning of selected services for the Cisco IGX 8400 Series switches that are running Switch Software Release 9.3.30 or earlier.

Table 8 Cisco WAN Switching Release 9.3 Documentation (continued)

Title	Description
9.3.42 Version Software Release Notes Cisco WAN Switching System Software DOC-7813227=	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.
Cisco IGX 8400 Series Regulatory Compliance and Safety Information DOC-7813227=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco IGX 8400 Series switch.

MGX 8850 Multiservice Switch Release 1.1.40

The product documentation for the installation and operation of the Cisco MGX 8850 Multiservice Switch is listed in Table 9.

Table 9 MGX 8850 Multiservice Switch Release 1.1.40 Documentation

Title	Description
Cisco MGX 8850 Multiservice Switch Installation and Configuration, Release 1.1.3 DOC-7811223=	Provides installation instructions for the Cisco MGX 8850 multiservice switch.
Cisco MGX 8800 Series Switch Command Reference, Release 1.1.3 DOC-7811210=	Provides detailed information on the general command line for the Cisco MGX 8850 switch.
Cisco MGX 8800 Series Switch System Error Messages, Release 1.1.3 DOC-7811240=	Provides error message descriptions and recovery procedures.
Cisco MGX 8850 Multiservice Switch Overview, Release 1.1.3 OL-1154-01 (online only)	Provides a technical description of the system components and functionality of the Cisco MGX 8850 multiservice switch from a technical perspective.
Cisco MGX Route Processor Module Installation and Configuration Guide, Release 1.1 DOC-7812278=	Describes how to install and configure the Cisco MGX Route Processor Module (RPM/B and RPM-PR) in the Cisco MGX 8850, the Cisco MGX 8250, and the Cisco MGX 8230 Release 1 switch. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01	Describes how to install and configure VISM in the Cisco MGX 8850, Cisco MGX 8250, and Cisco MGX 8230 Release 3 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.

Table 9 MGX 8850 Multiservice Switch Release 1.1.40 Documentation (continued)

Title	Description
Release Notes for Cisco Voice Interworking Service Module Release 3.1 OL-2785-01	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.
Release Notes for Cisco WAN MGX 8850 Release 1, MGX 8250, and MGX 8230 Software Version 1.1.41 DOC-7813594=	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.

MGX 8250 Edge Concentrator Release 1.1.40

The documentation for the installation and operation of the Cisco MGX 8250 Edge Concentrator is listed in Table 10.

Table 10 MGX 8250 Multiservice Gateway Documentation

Title	Description
Cisco MGX 8250 Edge Concentrator Installation and Configuration, Release 1.1.3 DOC-7811217=	Provides installation instructions for the Cisco MGX 8250 Edge Concentrator.
Cisco MGX 8250 Multiservice Gateway Command Reference, Release 1.1.3 DOC-7811212=	Provides detailed information on the general command line interface commands.
Cisco MGX 8250 Multiservice Gateway Error Messages, Release 1.1.3 DOC-7811216=	Provides error message descriptions and recovery procedures.
Cisco MGX 8250 Edge Concentrator Overview, Release 1.1.3 DOC-7811576=	Describes the system components and functionality of the Cisco MGX 8250 Edge Concentrator from a technical perspective.
Cisco MGX Route Processor Module Installation and Configuration Guide, Release 1.1 DOC-7812278=	Describes how to install and configure the Cisco MGX Route Processor Module (RPM/B and RPM-PR) in the Cisco MGX 8850, the Cisco MGX 8250, and the Cisco MGX 8230 Release 1 switch. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01	Describes how to install and configure VISM in the Cisco MGX 8850, Cisco MGX 8250, and Cisco MGX 8230 Release 3 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.

Table 10 MGX 8250 Multiservice Gateway Documentation (continued)

Title	Description
Release Notes for Cisco Voice Interworking Service Module Release 3.1 OL-2785-01	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.
Release Notes for Cisco WAN MGX 8850 Release 1, MGX 8250, and MGX 8230 Software Version 1.1.41 DOC-7813594=	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.

MGX 8230 Multiservice Gateway Release 1.1.40

The documentation for the installation and operation of the Cisco MGX 8230 Edge Concentrator is listed in Table 11.

Table 11 MGX 8230 Multiservice Gateway Documentation

Title	Description
Cisco MGX 8230 Edge Concentrator Installation and Configuration, Release 1.1.3 DOC-7811215=	Provides installation instructions for the Cisco MGX 8230 Edge Concentrator.
Cisco MGX 8230 Multiservice Gateway Command Reference, Release 1.1.3 DOC-7811211=	Provides detailed information on the general command line interface commands.
Cisco MGX 8230 Multiservice Gateway Error Messages, Release 1.1.3 DOC-78112113=	Provides error message descriptions and recovery procedures.
Cisco MGX 8230 Edge Concentrator Overview, Release 1.1.3 DOC-7812899=	Provides a technical description of the system components and functionality of the Cisco MGX 8250 Edge Concentrator from a technical perspective.
Cisco MGX Route Processor Module Installation and Configuration Guide, Release 1.1 DOC-7812278=	Describes how to install and configure the Cisco MGX Route Processor Module (RPM/B and RPM-PR) in the Cisco MGX 8850, Cisco MGX 8250, and Cisco MGX 8230 Release 1 switch. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01	Describes how to install and configure VISM in the Cisco MGX 8850, Cisco MGX 8250, and Cisco MGX 8230 Release 3 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.

Table 11 MGX 8230 Multiservice Gateway Documentation (continued)

Title	Description
Release Notes for Cisco Voice Interworking Service Module Release 3.1 OL-2785-01	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.
Release Notes for Cisco WAN MGX 8850 Release 1, MGX 8250, and MGX 8230 Software Version 1.1.41 DOC-7813594=	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.

Conventions

This publication uses the following conventions.

Command descriptions use these conventions:

- Commands and keywords are in **boldface**.
- Arguments for which you supply values are in *italics*.
- Required command arguments are inside angle brackets (< >).
- Optional command arguments are in square brackets ([ ]).
- Alternative keywords or variables are separated by vertical bars (|).

Examples use these conventions:

- Terminal sessions and information the system displays are in `screen` font.
- Information you enter is in **`boldface screen`** font.
- Nonprinting characters, such as passwords, are in angle brackets (< >).
- Default responses to system prompts are in square brackets ([ ]).

Notes, cautions, and tips use the following conventions and symbols

Note Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Tip Provides additional information that can help you understand the product or complete a task more efficiently.

Warning **This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, you must be aware of the hazards involved with electrical circuitry and familiar with standard practices for preventing accidents. (To see translated versions of this warning, refer to the *Regulatory Compliance and Safety Information* document that accompanied the product.)**

Obtaining Documentation

These sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at this URL:

http://www.cisco.com

Translated documentation is available at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

Ordering Documentation

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

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You can e-mail your comments to bug-doc@cisco.com.

You can submit your comments by mail by using the response card behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from online tools by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

If you want to obtain customized information and service, you can self-register on Cisco.com. To access Cisco.com, go to this URL:

http://www.cisco.com

Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Cisco TAC inquiries are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.

- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

The Cisco TAC resource that you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

You can use the Cisco TAC Web Site to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to this URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

http://www.cisco.com/register/

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC Web Site, you can open a case online by using the TAC Case Open tool at this URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

Preparing for Configuration

This chapter introduces the Cisco MGX 8850 and the Cisco MGX 8950 multiservice switches and common switch topologies, provides an overview of the configuration process, and presents guidelines for collecting the information you will need to complete the configuration.

Cisco MGX 8850 and Cisco MGX 8950 Switches

TheCisco MGX 8850 multiservice switch and the Cisco MGX 8950 multiservice switch provide support for the following features:

- Permanent virtual circuits (PVCs)
- Soft permanent virtual paths (SPVPs)
- Soft permanent virtual circuits (SPVCs)
- Switched virtual circuits (SVCs)

The Cisco MGX 8950 switch includes a cell bus to operate the combination of the PXM45 and the new XM60 card, which provides 240 Gbps as opposed to 45 Gbps on the PXM45 in the Cisco MGX 88500.

The following table identifies the capabilities supported in the Cisco MGX 8850 and Cisco MGX 8950 switches.

Table 1-1 Cisco MGX 8850 vs. Cisco MGX 8950 Capabilities

Feature	Cisco MGX 8850	Cisco MGX 8950
Total Number of Slots	32 single-height or 16 double-height or combination.	32 single-height or 16 double-height or combination.
Slots for Processor Cards	2 double-height.	2 double-height.
Slots for Service Modules	24 single-height or 12 double-height or combination.	24 single-height or 12 double-height or combination.
Physical Attributes		
Height	29.75	29.75
Width	17.72	17.72
Depth	21.5	21.5
Services		
Local Switching	Yes	Yes

Table 1-1 Cisco MGX 8850 vs. Cisco MGX 8950 Capabilities (continued)

Feature	Cisco MGX 8850	Cisco MGX 8950
PNNI Routing	Yes	Yes
Feeder to BPX 8600	Yes	
Feeder to Cisco MGX 8850 PXM-45	Yes	Yes
Feeder to IGX	Yes	
Automatic Protection Switching (APS 1+1)	Yes	Yes
Switching Capacity	45 Gbps	240 Gbps
Trunk/Port Interfaces		
T1/E1	16/AXSM-E card 32/AXSM-32--E card	16/AXSM-E card 32/AXSM-32-E card
T3/E3	16/card; AXSM, AXSM/B, or AXSM-E 12/FRSM	16/AXSM/B card
OC-3c/STM-1	8/AXSM-E card 16/AXSM or AXSM/B card	16/AXSM/B card
OC-12c/STM-4	2/AXSM-E card 4/AXSM or AXSM/B card	4/AXSM/B card
OC-48c/STM-16	1/AXSM or AXSM/B card	1/AXSM/B card
Front Cards		
PXM45	Yes Supports up to 99 interfaces.	No
PXM45/B	Yes Supports up to 192 interfaces. Up to 99 of these interfaces can be used for NNI trunks. The remaining interfaces are used for UNI trunks.	Yes Supports up to 192 interfaces. Up to 99 of these interfaces can be used for NNI trunks. The remaining interfaces are used for UNI trunks.
AXSM/A **Note** In this document, the first release of the AXSM card is referred to as the AXSM/A.	Yes	No
AXSM/B	Yes	Yes
AXSM-E	Yes	No
AXSM-32-E	Yes	No
FRSM-12	Yes	No
RPM-PR	Yes	Yes
XM-60	No	Yes

Typical Topologies

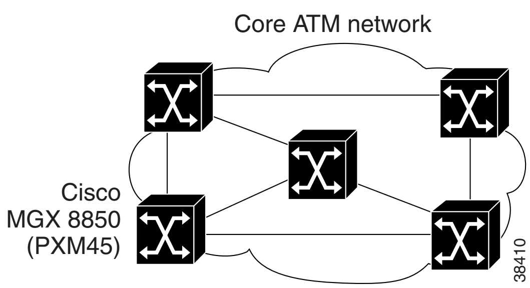
Release 2.1 of the Cisco MGX 8850 and the Cisco MGX 8950 switches support the following topologies:

- Core switch
- Multiservice edge aggregation
- DSL edge aggregation

Core Switch

Figure 1-1 shows the switch operating in a core switch topology.

Figure 1-1 Core Switch Topology



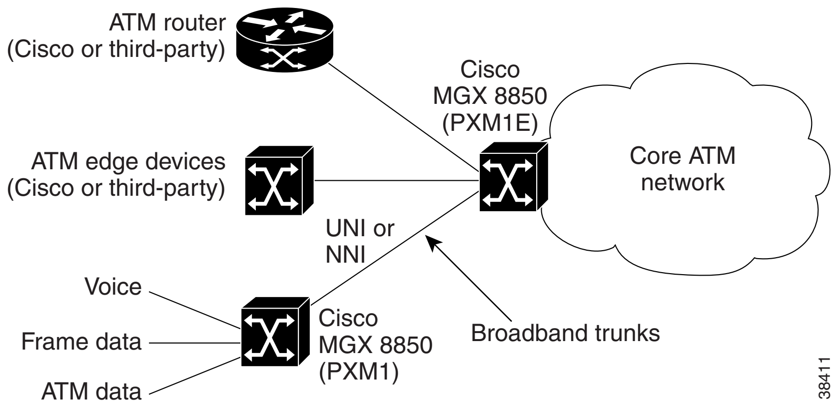
In the core switch topology, the switch works with other ATM switches to transfer broadband ATM traffic from one ATM edge device to another. The core acts like a freeway, and the edge devices act like freeway on-ramps.

The Cisco MGX 8850 and the Cisco MGX 8950 switches support the following types of trunks: T1 and E1 (Cisco MGX 8850 only), DS3, E3, OC-3, OC-12, OC-48, STM-1, STM-4, and STM-16. Typically, core edge nodes communicate with multiple external nodes over relatively slow broadband trunks such as DS3, OC-3, and STM-1 trunks. The internal core node communicates with other core nodes using relatively fast links such as OC-12, OC-48, and STM-16 trunks.

Multiservice Edge Aggregation

Figure 1-2 shows the switch operating in a multiservice edge aggregation topology.

Figure 1-2 Multiservice Edge Aggregation Topology



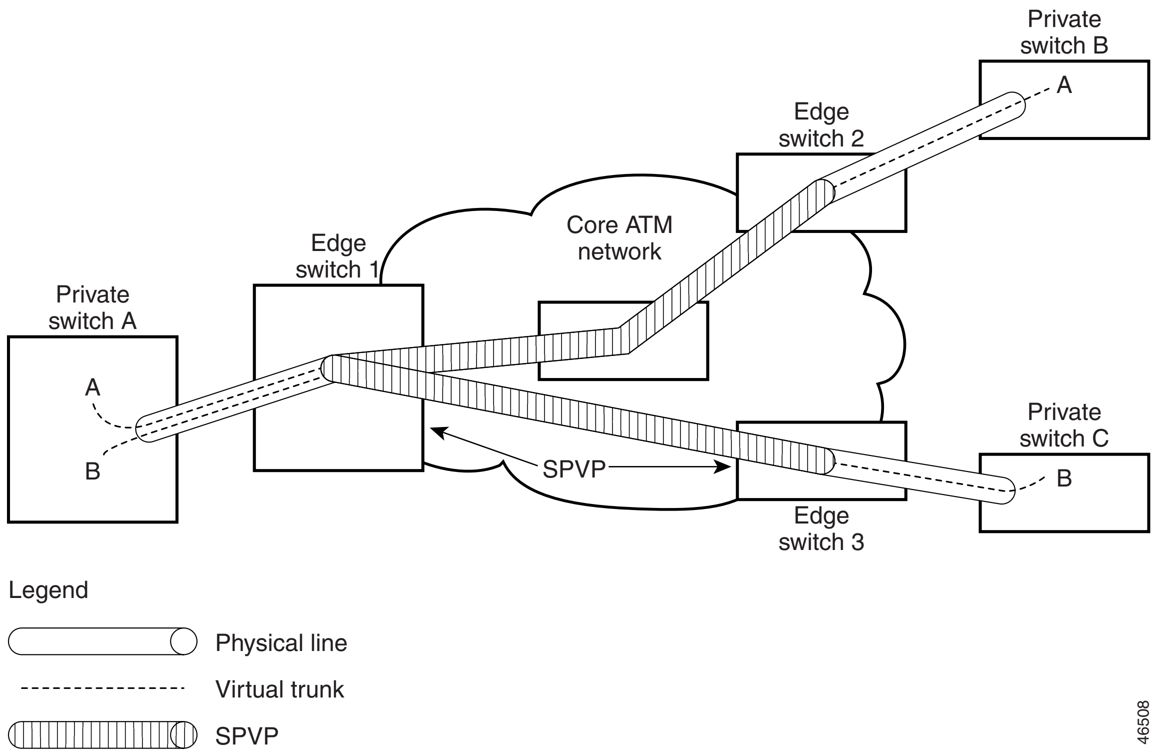
In the multiservice edge aggregation topology, the switch is colocated with other ATM equipment and communicates with one or more core switches at remote locations. The switch aggregates the traffic from local ATM devices, and packages it for high-speed communications over the core.

Typically, multiservice edge nodes communicate with colocated ATM devices over relatively slow broadband trunks such as DS3 and E3 trunks. The multiservice edge node communicates with core nodes using relatively fast links such as OC-12, OC-48, and STM-16 trunks.

The Cisco MGX 8850 Release 1 node shown in Figure 1-2 is called a feeder node. For instructions on configuring the Cisco MGX 8850 Release 2.1 switch to communicate with an Cisco MGX 8850 Release 1 feeder node, see Chapter 6, "Provisioning AXSM Communication Links."

Cisco MGX 8850 and the Cisco MGX 8950 edge nodes also support virtual trunks as shown in Figure 1-3.

Figure 1-3 Virtual Trunk Topology



A virtual trunk provides a private virtual network path through an independent network such as a public ATM network. Using virtual trunks, Company A can establish a private virtual path between two sites using a public ATM network that supports this feature. From Company A's point of view, they have a private virtual path between the two sites that can support multiple virtual circuits (VCs). Company A's network topology is completely private, as all communications are simply passed between edge devices, with no need for translation or routing. To accomplish this, the virtual trunk supports the Service Specific Connection Oriented Protocol (SSCOP) (virtual channel identifier [VCI = 5]), Private Network-to-Network Interface (PNNI) (VCI = 18) and Integrated Local Management Interface (ILMI) (VCI = 16) signaling protocols.

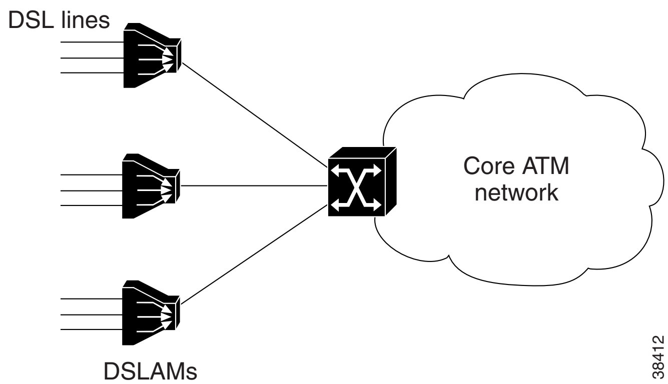
Figure 1-3 shows two virtual trunks, Virtual Trunk A and Virtual Trunk B. At Private Switch A, both virtual trunks use the same line to connect to the core ATM network. Within the core ATM network, soft virtual permanent paths (SPVPs) are defined to enable direct communications between the core edge nodes. The result is that Private Switch A has virtual trunks to Private Switches B and C and communicates with them as though they were directly connected.

DSL Aggregation

In the DSL edge aggregation topology, the switch is colocated with Digital Subscriber Line Access Multiplexers (DSLAMs) and communicates with one or more core switches at remote locations. The switch aggregates the DSL traffic from multiple DSLAMs and packages it for high-speed communications over the core.

Figure 1-4 shows the switch operating in a Digital Subscriber Link (DSL) edge aggregation topology.

Figure 1-4 DSL Edge Aggregation Topology



Typically, DSL edge nodes communicate with colocated DSLAMs over relatively slower broadband trunks such as DS3 and E3 trunks. The DSL edge node communicates with core nodes using relatively faster links such as OC-3, OC-12, and OC-48 trunks.

Routing Technologies

This release of the Cisco MGX 8850 and the Cisco MGX 8950 switches supports both Private Network-to-Network Interface (PNNI) and Multiprotocol Label Switching (MPLS) routing. These protocols can be used simultaneously on the same switch and on the same link.

Configuration Tasks

Switch configuration is easier if you are familiar with the overall configuration process. To configure and start up the switch, you need to do some or all of the following tasks:

- Configure general switch features
- Configure the physical connections to other devices
- Provision ATM connections to other devices
- Enable MPLS or PNNI call routing

This chapter describes how to collect or create the information you need to complete these tasks. These tasks are described in the following chapters:

Chapter 2, “Configuring General Switch Features,” describes how to set up general switch features such as the date, the PNNI controller, and network management. You need to follow the procedures in this chapter to prepare your switch for general operation.

Chapter 3, “Preparing AXSM Cards and Lines for Communication,” describes how to configure card and line redundancy, and how to bring up lines for physical layer communications.

Chapter 5, “Preparing RPM-PR Cards for Operation,” describes how to initialize RPM cards and configure card redundancy to support of MPLS routing and communications.

Chapter 6, "Provisioning AXSM Communication Links," describes how to configure ATM communications on ATM Switching Service Module (AXSM) lines and how to configure different types of connections to other ATM devices.

For instructions on configuring different ways to manage the Cisco MGX 8850 and the Cisco MGX 8950 switches, see Appendix C, "Supporting and Using Additional CLI Access Options."

Collecting Information

To successfully configure the Cisco MGX 8850 and the Cisco MGX 8950 switches, you must collect information about the other devices to which it will connect. Also, you need to know the line speeds and protocols used on the trunks that connect to the switch. For PNNI routing, you also need to have an addressing plan for the network in which the switch is installed. This information can be grouped into the following categories:

- General configuration data
- Edge device and ATM device trunk data
- Core node trunk data

The following sections introduce these types of data and provide guidelines for collecting the data.

General Configuration Data

During configuration, you will need to enter general configuration data that describes the switch and how it will be used in the network. This data includes

- Unique switch name
- ATM addressing plan
- IP addressing plan
- Administrator data
- Network clock source plan
- Network management plan
- Line and trunk data

The following sections describe these topics in more detail.

Unique Switch Name

Each switch must have its own name (which consists of up to 32 characters), unique within the ATM network. If you are adding a switch to a network, find out if the network administrator has established switch naming conventions, and find out which names have already been used. It is a good practice to name switches according to location, as such names convey both the switch identity and its location. The procedure for setting the name is described in "Setting and Viewing the Switch Name" in Chapter 2, "Configuring General Switch Features."

ATM Addressing Plan

An ATM network addressing plan is critical for successful operation of the Cisco MGX 8850 and the Cisco MGX 8950 switches in an ATM network. Both MPLS and PNNI networks require unique ATM addresses on each switch. However, the PNNI protocol uses structured network addresses to logically group network devices and determine routes between devices. For PNNI networks, an ATM address plan is required.

PNNI network addressing is described in the *Cisco MGX and SES PNNI Network Planning Guide*.

IP Addressing Plan

An IP network addressing plan is required for switch management. IP network addressing is described in "Guidelines for Creating an IP Address Plan," later in this chapter.

Administrator Data

In most cases, more than one administrator will manage the switch. The Cisco MGX 8850 and the Cisco MGX 8950 switches support multiple administrators and several different administration levels. As part of the planning process, you might want to identify who will be managing the switch and at what level. You can learn more about managing administrators by reading the "Configuring User Access" section in Chapter 2, "Configuring General Switch Features."

Network Clock Source Plan

Clock synchronization in an ATM network is very important. If two switches have trouble synchronizing their communications, traffic between the switches may have excessive errors or line failures. MGX switches support two methods of network clock synchronization:

- manual
- network clock distribution protocol (NCDP)

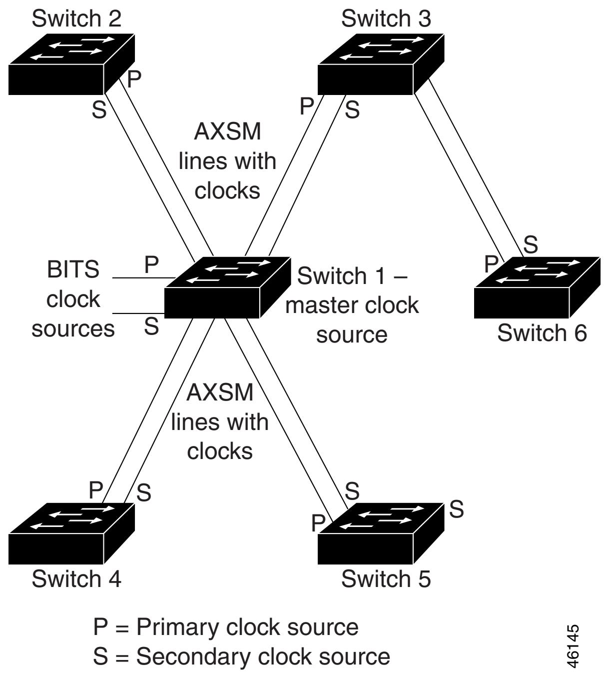
Both of these methods of clock synchronization are described in the sections that follow.

Note Manual clock configuration and NCDP configuration operate independently of one another. This means that you can configure both versions of network clock sourcing on your network. However, only one version can be enabled at a time. You cannot run your manual network clock configuration on your network while NCDP is running, and vice-versa. However, both configurations are stored in the disk database. Therefore, if you disable NCDP, the network reverts back to your original manual network clock configuration. If you enable NCDP on that same network at a later point, the network will revert back to the original NCDP configuration.

Planning for Manual Clock Synchronization

In manual clock source configurations, you need to configure a primary and secondary clock source, which are distributed throughout the network. The secondary clock source takes over if the primary clock source fails. You can configure a network setup with one master clock source, or with a secondary to ensure better network clock stability. The secondary master clock source takes over if the primary master clock source Figure 1-5 shows an example network clock source topology.

Figure 1-5 Example Network Clock Source Topology with a Single Master Clock Source

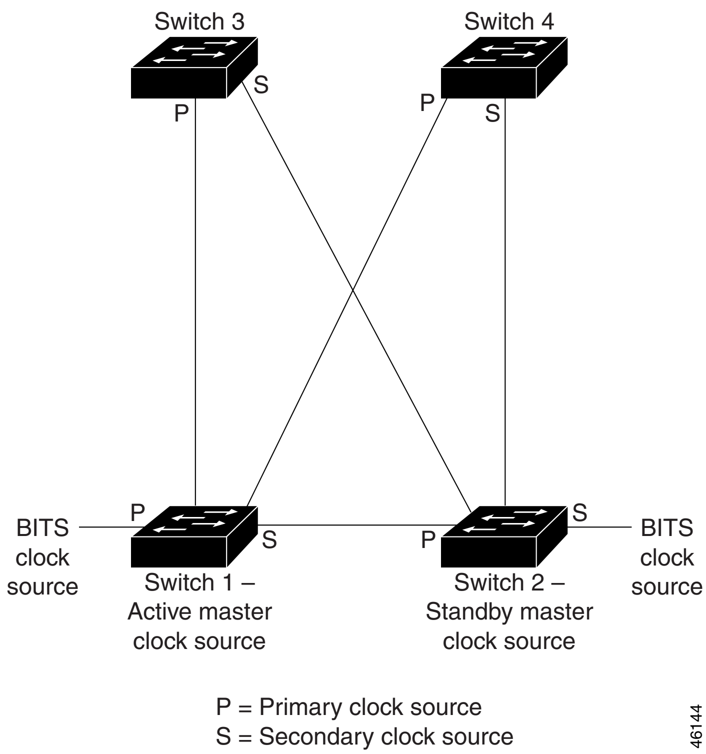


In Figure 1-5, Switch 1 provides the master network clock source to the rest of the network and uses highly accurate external Building Integrated Timing System (BITS) clock sources to time its transmissions. These BITS clock sources are T1 or E1 lines with Stratum-1, 2, or 3 clock signals. Switch 1 uses one BITS line as the primary clock source and uses the secondary BITS source only if a failure occurs on the primary BITS line. If the primary BITS line fails and recovers, the switch reverts to the primary clock source if the revertive option was set when the primary clock was configured. If the revertive option was not set, you must manually re-configure the primary clock.

Switches 2 through 5 synchronize their transmissions to Switch 1 with the master clock signal, which they receive over AXSM lines. Switch 6 synchronizes its communications using the master clock source, which is forwarded from Switch 3. In this topology, all switches synchronize to the same clock source, and this configuration reduces the possibility that two switches might not be able to synchronize communications.

Figure 1-6 shows an example network clock source topology that uses two master clock sources.

Figure 1-6 Example Network Clock Source Topology with Two Master Clock Sources



In Figure 1-6, Switches 1 and 2 both use BITS clock sources. Switch 1 operates as the master and distributes its BITS clock source over AXSM lines to Switches 2 through 4. Switch 2 is the standby master and receives its primary clock signal over the AXSM line from Switch 1. As long Switch 1 and its primary BITS clock source are operating correctly, the entire network is synchronized to the BITS clock source from Switch 1.

In this example, the secondary clock source for Switch 2 is its BITS clock source, and all other switches are configured to use the AXSM lines from Switch 2 as their secondary clock source. If Switch 1 or its BITS clock source fails, all the switches, including Switch 1, start using the clock signals from Switch 2 for network communications. This configuration preserves network sychronization when either a clock source or a switch fails.

To develop a network clock source plan, create a topology drawing and identify which switches serve as active and standby master clock sources. For each switch that receives clock sources from other switches, indicate which lines carry the primary and secondary clock signals.

Consider the following information when you create your manual network clock source plan:

- Master clock sources that are located near the center of the network minimize clock signal propagation delay.
- BITS clock interfaces receive Stratum-3 or higher clock signals.
- Multiple master clock sources provide fault tolerance.
- If both primary and secondary external clock sources fail, the switch uses an internal Stratum-3 clock.
- When using an external clock source and redundant PXM cards, use a Y-cable to connect that clock source to the same clock port on both PXM cards. Do not run separate external clock sources to each card, as this can produce timing problems.
- If the switch is using its own internal stratum 3 clock and a primary or secondary clock source recovers, the switch will use the recovered clock source.
- If no primary or secondary clock sources are configured, the switch uses the internal Stratum-3 clock.
- Primary and secondary BITS clocks can be configured after the switch is initialized. For more information, see the "Configuring Clock Sources" section in Chapter 1, "Preparing for Configuration."
- Primary and secondary AXSM clocks must be configured after the AXSM cards and lines are configured. For more information, see "Configuring AXSM Line Clock Sources" in Chapter 6, "Provisioning AXSM Communication Links."

Planning for NCDP Synchronization

Release 3 of the MGX switches supports a network clock distribution protocol (NCDP), which selects the best clock in your network for synchronization, and automatically configures the path to that clock for each node throughout your network. In an NCDP clock configuration, there are no primary and secondary clock sources. Instead, you configure several clock sources for the nodes in your network, from which NCDP selects the best (or root) and second best clock source for the network. Once NCDP has selected the root clock source, it is propagated to all the nodes in the network so that all nodal clocks are synchronized. If the root clock source fails, the second best clock source becomes the root clock source. If the second best clock source fails, NCDP selects the third best clock source to take over as the root clock source, and so forth.

If you want to use NCDP to set up your network clocks, you must first enable the NCDP protocol, as described in "Managing NCDP Clock Sources" in Chapter 7, "Switch Operating Procedures." Once you enable NCDP on your node, it is automatically enabled on all NNI ports on the node. When NCDP is enabled, a root clock source is automatically selected and distributed to all nodes in the network that have NCDP enabled. NCDP automatically selects an internal oscillator on one of the NCDP nodes to be the root clock source. Each NCDP node in the network is synchronized to this root clock reference. If you do not want the root clock source to be an internal oscillator, you can configure it to come from an external source with the **cnfncdpclksrc** command, as described in Chapter 7, "Switch Operating Procedures", in the section "Configuring an NCDP Clock Source"

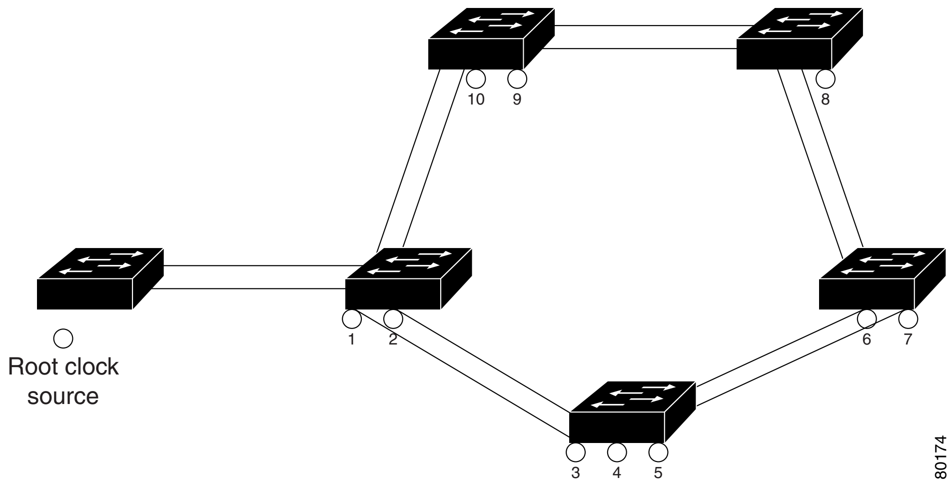
NCDP uses the following criteria to finding the best root clock source for the network:

- Priority (should be sufficient to find the root)
- Stratum level (should be sufficient as a tie-breaker)
- Clock source reference
- ATM address of the switch

You can modify the priority, stratum level, and clock source reference through the **cnfncdpclksrc** command, as described in Chapter 7, "Switch Operating Procedures", in the section "Configuring an NCDP Clock Source"

Figure 1-7 shows an example NCDP network clock source topology. The numbers represent the priority of each network clock source, with 1 being the highest priority (or second best clock source) and 10 being the lowest priority. In this example, if the root clock source fails, the clock source with priority 1 would take over as the root clock, and so forth.

Figure 1-7 Example NCDP Network Clock Source Topology



Consider the following information when you create your NCDP network clock source plan:

- Clock sources that are located near the center of the network minimize clock signal propagation delay.
- Once you enable NCDP on an NNI port, NCDP is enabled on all NNI ports by default. This include PNNI ports, IISP ports, and AINI ports.
- NCDP is disabled on virtual trunks by default.
- You can add clock sources to any UNI or clocking ports on the node.
- On every port with NCDP enabled, a control VC is established on which configuration and network topology information is exchanged between the connected nodes. On non-virtual trunks, the control VC is always established on the VCI 34, and on the VPI 0. On Virtual Trunks (VTs), the control VC is established on the VCI 34, and on the minimum negotiated VPI.
- BITS clock interfaces receive Stratum-3 or higher clock signals.
- Multiple clock sources provide fault tolerance.
- Clock Distribution is supported for up to 200 nodes in the network. A network containing more than 200 nodes should have multiple clock sources.
- Once you enable NCDP on one port, it is automatically enabled on all NNI ports in the network.
- When using an external clock source and redundant PXM cards, use a Y-cable to connect that clock source to the same clock port on both PXM cards. Do not run separate external clock sources to each card, as this can produce timing problems.

- If a failed clock source recovers, the switch will use not use the recovered clock source unless you re-add it with the network with the **cnfncdpclksrc** command.
- Clock sources must be configured after the AXSM cards and lines are configured. For more information, see “Configuring AXSM Line Clock Sources” in Chapter 6, “Provisioning AXSM Communication Links.”

Note Cisco advises against running NCDP on VP trunks.

To develop an NCDP network clock source plan, create a topology drawing and identify all the configured clock sources on each switch in the network. Identify the priority of each clock source.

Network Management Plan

You can use the following tools to manage the Cisco Cisco MGX 8850 and the Cisco MGX 8950 switches:

- Command line interface (CLI) provided with the switch
- Cisco WAN Manager
- CiscoView
- Third-party SNMP manager

The CLI that comes with the switch is the least expensive option. To use the other tools, you must purchase Cisco WAN Manager (CWM) or a Simple Network Management Protocol (SNMP) manager. The Cisco MGX 8850 and the Cisco MGX 8950 switches come with an SNMP agent for use with an SNMP manager.

The advantage to using CWM or an SNMP manager is that you can use one program to simultaneously manage multiple devices. Also, CWM is the only management tool that can configure Service Class Templates (SCTs), which are described in Chapter 6, “Provisioning AXSM Communication Links.” Most installations require at least one CWM workstation to complete the switch configuration.

Cisco View is a CWM component that can be used independently of CWM to provide limited monitoring and management capabilities.

To determine which versions of CWM and Cisco View are compatible with this release, refer to the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Release 2.1.60.*

For information on managing the switch with an SNMP manager, refer to the following: *Cisco MGX 8850 and MGX 8950 SNMP Reference, Release 2.1.*

Line and Trunk Data

When configuring lines and trunks that connect the switch to other devices, you need to collect the following:

- Physical line type and configuration data
- ATM port configuration data

The Cisco MGX 8850 and the Cisco MGX 8950 switches support many of the most common ATM configuration parameters. To successfully configure lines and trunks, be sure that the configuration settings used on the switch match the configuration settings used at the other end of the line or trunk. In some cases, options you want to use at one end of the trunk are not supported at the other end. In these situations, change your configuration plan to use settings that are supported at both ends.

Chapter 3, “Preparing AXSM Cards and Lines for Communication,” describes how to configure physical layer line communications. Chapter 6, “Provisioning AXSM Communication Links,” describes how to configure ATM ports.

IMA support on PXM1E

The AXSME-32-T1-E1 card supports IMA (I inverse Multiplexing for ATM) 1.0 and 1.1 on up to 32 T1 or E1 ports. The IMA feature enables multiple T1 or E1 lines to be grouped into a single high-speed ATM port.

The advantage of the IMA feature is that you do not need T3/E3 circuits to support high bandwidth on your switch. T1 IMA links support up to 12 Mbps, and E1 IMA links support up to16 Mbps.

If IMA is disabled on the AXSME-32-T1-E1 each T1 or E1 interface can be configured as a single port running at full line rate.

When IMA is enabled on the AXSME-32-T1-E1 a configured group of T1 or E1 lines can support one T1 or E1 port. A single IMA group can support up to 16 T1 or E1 links. Multiple IMA ports of any configuration are supported per card. For example, you can have 4 IMA Groups with 4 links each.. At the extremes, you can have 16 Groups with 1 link each or one Group with 16 links. If a T1/E1 line in an IMA group fails, the IMA port automatically adjusts to continue operation over the remaining lines.

Note Each T1/E1 or IMA port supports only one T1 or E1 line at a time.

Note During AXSME switchovers, configured IMA groups are not operational to carry data. There will be a delay until the IMA groups become functional, and the length of this delay depends on the transmission delay between the IMA endpoints. Traffic loss can be around 3 seconds, and connections may be re-routed.

To configure IMA links on an AXSME-32-T1-E1 card, refer to the “Cisco AXSM Software Configuration Guide and Command Reference for the MGX 8850 (PXM45) and the MGX 8950”

Planning for Card and Line Redundancy

Card redundancy is a feature that associates two cards, so that if one card fails, the other card assumes operation. Processor Switch Module 45 (PXM45) card redundancy is preconfigured on the Cisco MGX 8850 and the Cisco MGX 8950 switches for PXM45 and PXM45/B cards. If PXM45 cards and their associated back cards are inserted in slots 7 and 8, they will automatically operate as redundant cards. One card assumes the active role, and the other card operates in standby mode.

Note Throughout this guide, the term PXM45 is used to refer to both the PXM45 and PXM45/B cards. The PXM45 has 128 MB of memory and can scale to 40K connections. The PXM45/B has 256 MB of memory and will support more than 40K connections in future software releases.

Redundancy setup and configuration is basically the same for AXSM and FRSM cards. AXSM cards or FRSM-12 cards and their associated lines can be configured for either standalone or redundant operation. Because a configuration change interrupts service and can require substantial configuration teardown, it is important to develop a redundancy plan early. The redundancy plan determines how AXSM and FRSM-12 cards must be installed in the chassis, and how lines must connect to the cards. Once the hardware is installed, the software configuration team uses the redundancy plan to configure the switch. The software configuration must match the hardware configuration.

Note Throughout this guide, the term AXSM is used to refer to all the AXSM cards. If a procedure or paragraph applies to only a specific AXSM card or specific AXSM cards, it will be specified as such. The first release of the AXSM card is referred to as the AXSM/A card. The second release of AXSM is referred to as the AXSM/B card.

RPM-PR cards can operate in 1:n redundancy mode, which means that one standby RPM-PR card can serve as a backup card for multiple active RPM-PR cards.

The Cisco MGX 8850 and the Cisco MGX 8950 switches support the following card and line redundancy options:

- Standalone AXSM/FRSM-12, redundant lines
- Redundant AXSM/FRSM-12 cards, standalone line
- Redundant AXSM/FRSM-12 cards, redundant lines
- Redundant RPM-PR cards

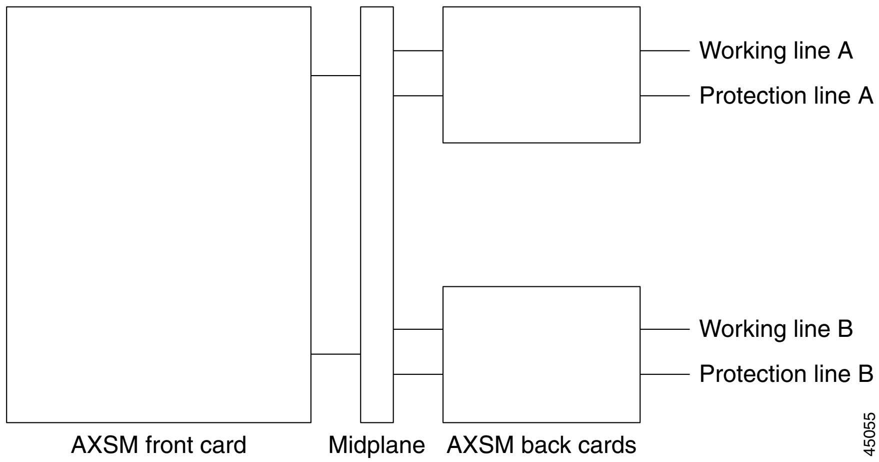
The following sections provide planning guidelines for these configurations.

Planning Single AXSM/FRSM-12 Front Card Configurations with Redundant Lines

AXSM/FRSM-12 cards can operate in either standalone or redundant mode. Standalone mode is the default mode, and standalone cards can be configured for either standalone line operation or Automatic Protection Switching (APS) line operation, which uses redundant lines for fault tolerance. If a single AXSM/FRSM-12 front card fails, all calls are lost and the associated lines go out of service. However, if the AXSM/FRSM-12 is configured to support redundant lines, a failure on the working line causes a switchover to the protected line, and operation continues.

Figure 1-8 shows how a single AXSM/FRSM-12 connects to redundant lines.

Figure 1-8 Single AXSM/FRSM-12 Front Card Configuration with Redundant Lines



The redundant lines shown in Figure 1-8 are labeled the working line and the protection line, as defined in the SONET specification for APS. The working line is the primary communications line, and the protection line takes over if the working line fails. If the protection line is being used for traffic and fails, the working line takes over.

Two types of APS communications are supported: 1+1 and 1:1. The 1+1 communications type transmits data on both the working line and the protection line. The 1:1 communications type transmits data on either the working line or the protection line.

Notice that both the working line and the protection line connect to the same back card in Figure 1-8. This configuration is also known as an intracard APS configuration. When planning an intracard APS configuration, consider the following:

- The working line and the protection line must connect to adjacent ports on the same back card.
- The working line must be assigned to an odd-numbered port. For example, the working line could be on port 1 and the protection line on port 2.
- The working line must be assigned to a lower numbered port than the protection line. For example, the working line could be on port 3 and the protection line on port 4. If the protection line is on port 2, do not assign the working line to port 3.

- Because the AXSM-1-2488 has only one OC-48 port on its back card, this card cannot be configured for intracard APS operation (although it can be configured for intercard APS, which is described later in this chapter).
- The switches at both ends of the APS lines must be configured for APS, and the role of each line (working or protection) must be the same at both ends of the line.

Planning Redundant AXSM/FRSM-12 Configurations with Standalone Lines

In a redundant AXSM/FRSM-12 configuration, matched sets of front and back cards are installed in the switch, and redundancy is established during software configuration. In a redundant AXSM/FRSM-12 configuration, a failure on the active AXSM/FRSM-12 causes a switchover to the standby AXSM/FRSM-12 card set, and no calls are lost.

Note This configuration provides fault tolerance for the AXSM/FRSM-12 front card only. This configuration does not provide fault tolerance for back cards or lines. If you need such a level of protection, use the redundant AXSM/FRSM-12 configuration with redundant lines.

Figure 1-9 shows how a redundant AXSM/FRSM-12 cards connect to standalone lines.

Figure 1-9 Redundant AXSM Configuration with Standalone Lines

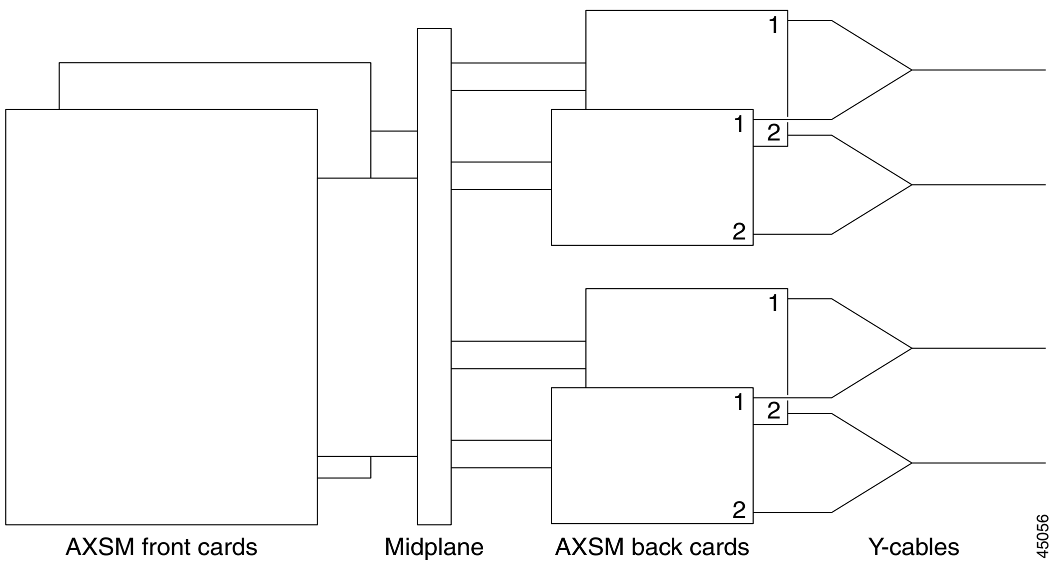


Figure 1-9 shows two complete sets of AXSM/FRSM-12 cards. Each port in an active card slot is connected to the corresponding port in the standby card slot through a Y-cable, which joins the two ports to a common line. If the front card in the active card set fails, the standby card set becomes active and continues to support calls over the shared communication line.

When planning a redundant AXSM/FRSM-12 configuration with a standalone line, consider the following:

- The redundant AXSM/FRSM-12 cards can be placed in any available slots; they do not have to be installed in adjacent slots, although doing so makes the cabling easier.
- The AXSM card sets must be identical. You cannot pair nonmatching cards, such as an AXSM T3/E3 card, with an AXSM OC-3 card.

- The switch ends of each Y-cable must connect to corresponding ports. For example, the cable connected to line 2 on the active lower bay back card must also connect to line 2 on the standby lower bay back card.
- Optical Y-cables must use single-mode fiber (SMF) cable, not multimode fiber (MMF).
- The remote end of the standalone line can connect to a standalone AXSM/FRSM-12 card or a redundant AXSM/FRSM-12 card set with a standalone line. (It cannot connect to an AXSM/FRSM-12 APS port.)

Planning Redundant AXSM Configurations with Redundant Lines

Maximum fault tolerance is achieved when redundant AXSM cards are used with redundant APS lines. In this configuration, fault tolerance is provided for the front card and for the combination of the back card and the communication line. If the active line or the back card to which it is connected fails, communications traffic is rerouted through the backup line and the back card to which it is connected.

Note APS is supported only on AXSM cards.

Figure 1-10 shows how a redundant AXSM card connects to redundant APS lines.

Figure 1-10 Redundant AXSM Configuration with Redundant Lines

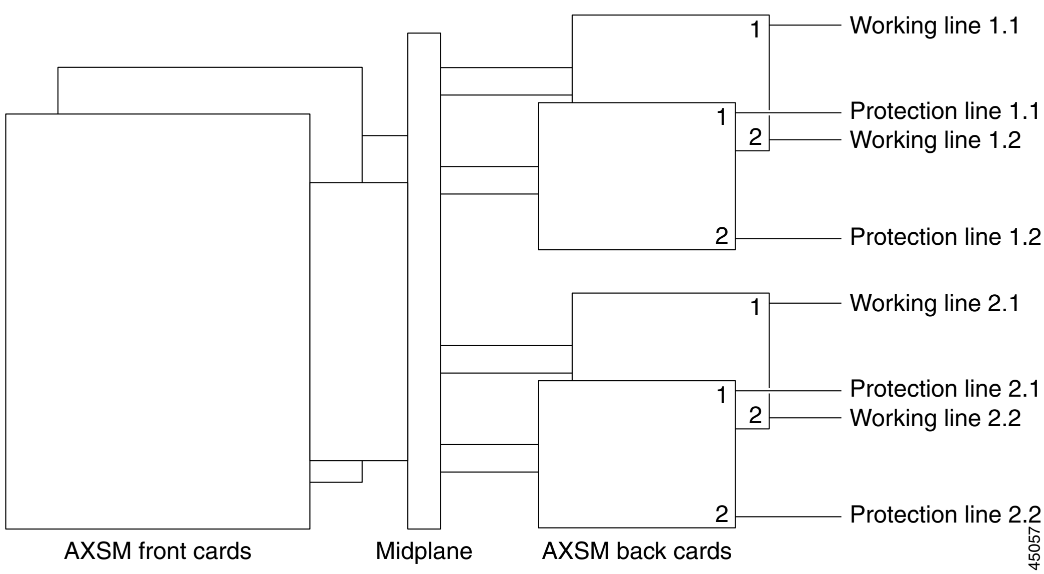


Figure 1-10 shows two complete sets of AXSM cards. Each port in each card slot connects to an independent line. If the front card in the active card set fails, the standby card set becomes active and continues to support calls over the shared communication line. If the working line fails, communications are rerouted through the protection line for that port.

When planning a redundant AXSM configuration with redundant lines, consider the following:

- The redundant AXSM cards must be placed in adjacent slots. They can be installed in slots 1 though 6 and slots 9 through 14.
- The AXSM card sets must be identical. You cannot pair unmatching cards such as an AXSM T3/E3 card and an AXSM OC-3 card.

- The redundant back cards must be joined together with the APS mini-backplane.
- The switches at both ends of the APS lines must be configured for APS, and the role of each line (working or protection) must be the same at both ends of the line.
- The working line must be defined on the primary card.
- The protection line can be defined on the same back card or on a different back card. Using a different back card provides greater fault tolerance.

Configuration Worksheets

Table 1-2 lists general switch parameters you will need to configure in each new switch.

Table 1-2 General Switch Configuration Parameters

Feature	Parameter Information	Value to Configure
PXM45 runtime software version number	Text	
Node name	Text	
Time zone	Enter a zone	
Time zone offset	Hours to offset	
PNNI controller	Controller ID	2
	Controller type	2 (PNNI)
	Controller name	
MPLS controller	Controller ID	3
	Controller type	3 (LSC)
	Controller name	
PNNI level and lowest peer group ID	Refer to the *Cisco MGX and SES PNNI Network Planning Guide*.	
PNNI node address	Refer to the *Cisco MGX and SES PNNI Network Planning Guide*.	
SPVC prefix	Refer to the *Cisco MGX and SES PNNI Network Planning Guide*.	

Table 1-2 General Switch Configuration Parameters (continued)

Feature	Parameter Information	Value to Configure
IP Addresses	Boot IP	
	Boot IP network mask	
	LAN IP	
	LAN IP network mask	
	ATM IP	
	ATM IP network mask	
	SLIP IP	
	SLIP IP network mask	
SNMP	Community	
	Contact	
	Location	

Table 1-3 lists general switch parameters you will need to configure on each AXSM card.

Table 1-3 General AXSM, AXSM-E, and AXSM-E-32 Card Configuration Parameters

Feature	Parameter Information	Value to Configure
Slot for this AXSM	Slot number	
AXSM runtime software version number	Text	
Redundant slot	Slot number	
Card SCT	SCT number	
Line 1 APS	Working index	
	Protection index	
	Mode	
Line 2 APS	Working index	
	Protection index	
	Mode	
Line 3 APS	Working index	
	Protection index	
	Mode	
Line 4 APS	Working index	
	Protection index	
	Mode	
Line 5 APS	Working index	
	Protection index	
	Mode	

Table 1-3 General AXSM, AXSM-E, and AXSM-E-32 Card Configuration Parameters (continued)

Feature	Parameter Information	Value to Configure
Line 6 APS	Working index	
	Protection index	
	Mode	
Line 7 APS	Working index	
	Protection index	
	Mode	
Line 8 APS	Working index	
	Protection index	
	Mode	
Line 9 APS	Working index	
	Protection index	
	Mode	
Line 10 APS	Working index	
	Protection index	
	Mode	
Line 11 APS	Working index	
	Protection index	
	Mode	
Line 12 APS	Working index	
	Protection index	
	Mode	
Line 13 APS	Working index	
	Protection index	
	Mode	
Line 14 APS	Working index	
	Protection index	
	Mode	
Line 15 APS	Working index	
	Protection index	
	Mode	
Line 16 APS	Working index	
	Protection index	
	Mode	
Line 17 APS (AXSM-32-E only)	Working index	
	Protection index	

Table 1-3 General AXSM, AXSM-E, and AXSM-E-32 Card Configuration Parameters (continued)

Feature	Parameter Information	Value to Configure
	Mode	
Line 18 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 19 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 20 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 21 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 22 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 23 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 24 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 25 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 26 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	

Table 1-3 General AXSM, AXSM-E, and AXSM-E-32 Card Configuration Parameters (continued)

Feature	Parameter Information	Value to Configure
Line 27 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 28 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 29 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 30 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 31 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	
Line 32 APS (AXSM-32-E only)	Working index	
	Protection index	
	Mode	

Table 1-4 lists general switch parameters you will need to configure on each FRSM-12 card.

Table 1-4 General FRSM-12 Card Configuration Parameters

Feature	Parameter Information	Value to Configure
Slot for this FRSM-12	Slot number	
FRSM-12 runtime software version number	Text	
Redundant slot	Slot number	
Card SCT	SCT number	
Line 1 APS	Working index	
	Protection index	
	Mode	

Table 1-4 General FRSM-12 Card Configuration Parameters (continued)

Feature	Parameter Information	Value to Configure
Line 2 APS	Working index	
	Protection index	
	Mode	
Line 3 APS	Working index	
	Protection index	
	Mode	
Line 4 APS	Working index	
	Protection index	
	Mode	
Line 5 APS	Working index	
	Protection index	
	Mode	
Line 6 APS	Working index	
	Protection index	
	Mode	
Line 7 APS	Working index	
	Protection index	
	Mode	
Line 8 APS	Working index	
	Protection index	
	Mode	
Line 9 APS	Working index	
	Protection index	
	Mode	
Line 10 APS	Working index	
	Protection index	
	Mode	
Line 11 APS	Working index	
	Protection index	
	Mode	
Line 12 APS	Working index	
	Protection index	
	Mode	

Guidelines for Creating an IP Address Plan

The switch provides the following interfaces for CLI, SNMP, and CWM access:

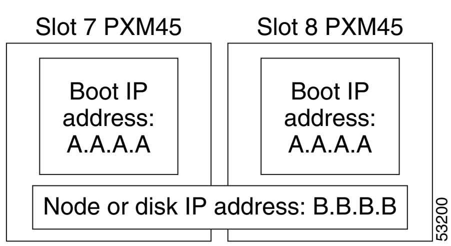
- Console Port (CP)
- Maintenance Port (MP)
- LAN 1 port
- ATM interface

Basic switch configuration and management can be completed by using a local terminal connected to the console port. However, to configure and manage the switch from a LAN connection, a modem connection, or with CWM, you need define an IP address for the appropriate interface.

Note This section discusses remote connectivity through the PXM45 LAN port. For information on using terminal servers, modems and CWM to access the switch, see Appendix C, "Supporting and Using Additional CLI Access Options."

A typical switch configuration requires either one or two IP addresses for LAN access. When the switch hosts a single PXM45 card, use just one IP address and assign it to both the boot and LAN IP address options (more on this later in this section). When the switch uses two PXM45 cards, you can choose to use one or two IP addresses. Figure 1-11 shows a redundant PXM45 configuration that uses two IP addresses.

Figure 1-11 Using Two IP Addresses for Switch Access



The configuration shown in Figure 1-11 provides the following benefits:

- Direct access to the active PXM45 using address B.B.B.B.
- Direct access to the standby PXM45 card using address A.A.A.A.
- The boot code on the standby PXM45 card can be upgraded without interrupting service on the active PXM45 card.
- You can perform additional procedures in backup boot mode on the standby card without interrupting the active card. These procedures include hard disk formats and file transfers.

When different IP addresses are used for the boot and LAN IP addresses, you can manage the active PXM45 card and the switch using the LAN or disk IP address, which is B.B.B.B in Figure 1-11. You can also access the standby PXM45 card using the boot IP address. When the same address is used for both the boot and LAN IP addresses, that address can be used only to manage the active PXM45 card.

Note Cisco MGX 8850 software releases prior to Release 2.0(12) supported unique addresses for the boot IP addresses on the PXM45 cards in slots 7 and 8. This approach required three unique addresses per switch. Beginning with Release 2.0(12), the boot IP addresses for both slots 7 and 8 must be set to the same IP address.

When planning IP addresses for your switch, use the following guidelines:

- If the switch has one PXM45 card, set the boot and LAN IP addresses to the same address.
- If the switch has two PXM45 cards and you want to minimize the number of IP addresses used, set both boot IP addresses and the LAN IP address to the same address.
- If the switch has two PXM45 cards and you want to maximize your control options from remote locations, assign the same boot IP address to each PXM45 card, and assign a different IP address to the LAN IP address.
- Be sure to define the default gateway IP address when defining the boot IP addresses.
- To minimize router configuration, choose boot, LAN, and default gateway IP addresses that are all on the same subnet.

For instructions on setting boot and LAN IP addresses, see the "Setting the LAN IP Addresses" section in Chapter 2, "Configuring General Switch Features."

CHAPTER 2

Configuring General Switch Features

This chapter describes how to set up general switch features that apply to multiple switch interfaces, beginning with a configuration quickstart procedure, which introduces the configuration tasks. The following sections provided detailed information on how to complete the configuration tasks.

Configuration Quickstart

The quickstart procedure is provided as an overview and as a quick reference for those who have already configured Cisco MGX 8850 and Cisco MGX 8950 switches.

	Command	Purpose
Step 1	**sysVersionSet** *version* **reboot**	Select the runtime firmware version the switch will use on the PXM45 card and restart the switch with that firmware. For example, `sysVersionSet "002.001.000.000"` Note that these commands must be entered at the PXM45 backup boot prompt: pxm45bkup>. See the "Initializing the Switch" section, which appears later in this chapter.
Step 2	*username* *password*	Start a management session. For instructions on starting a session from a terminal or workstation attached to the Console Port (CP), see the "Starting a CLI Management Session After Initialization" section, which appears later in this chapter. For information on other ways to manage a switch, see "Appendix C, "Supporting and Using Additional CLI Access Options." **Note** To perform all the procedures in this quickstart procedure, you must log in as a user with SERVICE_GP privileges. The default user with these privileges is *service* and the default password is *service*. For more information on access privileges, see the "Configuring User Access" section, which appears later in this chapter.

	Command	Purpose
Step 3	**adduser** <*username*> <*accessLevel*> Related commands: **cnfpasswd** **cnfuser** <*options*> **deluser** <*username*>	Configure user access. This step is optional. See the "Configuring User Access" section, which appears later in this chapter.
Step 4	**cnfname** <*node name*>	Configure the switch name. See the "Setting and Viewing the Switch Name" section, which appears later in this chapter.
Step 5	**cnfdate** <*mm:dd:yyyy*> **cnftmzn** <*timezone*> **cnftmzngmt** <*timeoffsetGMT*> **cnftime** <*hh:mm:ss*> Related commands: **dspdate**	Configure the switch time. See the "Viewing and Setting the Switch Date and Time" section, which appears later in this chapter.
Step 6	**addcontroller** <*options*> **cnfpnni-node** <*options*> **cnfspvcprfx** <*options*> Related commands: **dspcontrollers** **dspspvcprfx** **dsppnni-summary-addr**	Configure basic PNNI node parameters which include the PNNI controller, PNNI level, peer group ID, ATM address, node ID, and SPVC prefix. See the "Configuring PNNI Node Parameters" section, which appears later in this chapter.
Step 7	**addcontroller** <*options*> Related commands: **dspcontrollers**	Add the MPLS controller. See the "Configuring the MPLS Controller" section, which appears later in this chapter.
Step 8	**cnfclksrc** <*options*> or **cnfncdp**	Configure any BITS clock ports the switch will use. This step is optional. See the "Configuring Clock Sources" section, which appears later in this chapter. **Note** For information on configuring AXSM line clock sources, see the "Configuring AXSM Line Clock Sources" section in Chapter 6, "Provisioning AXSM Communication Links."
Step 9	**bootChange** **ipifconfig** <*options*>	Set the IP address or addresses for LAN access. See the "Setting the LAN IP Addresses" section, which appears later in this chapter.

	Command	Purpose
Step 10	**cnfsnmp** community [*string*] **cnfsnmp** contact [*string*] **cnfsnmp** location [*string*] Related commands: **dspsnmp**	Configure SNMP management. See the "Configuring for Network Management" section which appears later in this chapter.
Step 11	**dspcds** **dspcd** **cc** <*slotnumber*>	Verify the hardware configuration. See the "Verifying the Hardware Configuration" section, which appears later in this chapter.

Initializing the Switch

After you assemble a new switch, as described in either the *Cisco MGX 8850 Hardware Installation Guide (PXM45/B and PXM1E)* or the *Cisco MGX 8950 Hardware Installation Guide*, you must initialize the switch before you can configure it. Although PXM45 cards ship with the latest version of boot firmware on the front card, the runtime firmware cannot be loaded until both front and back cards have been installed. When you initialize the switch, you are configuring the switch to load a specific runtime firmware version from the PXM45 hard disk back card.

A new switch must be initialized using a console port management session. As shown in Figure 2-1, a console port management session requires a terminal or workstation with a serial connection to the Console Port (CP) port on the PXM45 UI-S3 back card.

Note Note that some or all of the commands discussed in this section require service-level or above user privileges. To access these commands, you must have debug (Service or Cisco level) privileges and passwords. Check with TAC for assistance.

Figure 2-1 Workstation Connection to Console Port

To initialize the switch, use the following procedure.

Step 1 Physically connect a terminal or workstation to the PXM45 UI-S3 back card as shown in Figure 2-1.

You can use any personal computer or UNIX workstation with VT-100 emulation software.

> **Note** You can connect the terminal to a PXM45 in either slot 7 or slot 8.

Step 2 Start the terminal, or, if you are using a workstation, start a terminal emulation program and configure it to connect to the switch through the serial port on the workstation. For instructions on configuring the terminal emulation program, refer to the documentation for the program.

The default switch configuration supports the following settings: 9600 bps, 8 data bits, no parity, 1 stop bit, no hardware flow control.

Step 3 At the workstation, enter the command that connects the terminal emulation program to another computer.

Step 4 If the switch power is not on, turn on the switch power as described in either the *Cisco MGX 8850 Hardware Installation Guide (PXM45/B and PXM1E)* or the *Cisco MGX 8950 Hardware Installation Guide*.

> **Note** You can connect the workstation to the switch before or after power is applied. If you connect the terminal emulation program to the switch before power is applied, the terminal emulation program displays the switch startup messages.

Step 5 If the switch does not display any messages or prompt, press **Return**.

When startup is complete for an uninitialized switch, it will display the PXM45 backup boot prompt:

```
pxm45bkup>
```

Step 6 Locate and write down the version number for the runtime firmware provided with your switch. You need this version number to complete the next step.

The version number is listed in the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* and the *Release Notes for Cisco MGX 8950 Software Release 2.1.60,* and must be entered using the same format listed in the firmware file name. For example, if the firmware filename is pxm45_002.001.060.000_mgx.fw, the firmware version number you will enter is **002.001.060.000**.

Step 7 When the PXM45 backup boot prompt appears, define the PXM45 runtime firmware version by entering the **sysVersionSet** command as follows:

```
pxm45bkup> sysVersionSet version
```

Replace *version* with the version number for the runtime firmware. For example,

```
pxm45bkup> sysVersionSet 002.000.001.000
```

Step 8 Reboot the switch by entering the **reboot** command as follows:

```
pxm45bkup> reboot
```

During initialization, the switch will appear to boot twice. When the reboot is complete, the switch displays the Login prompt, which indicates that the firmware is loaded and the switch is ready for configuration.

Tip The **sysVersionSet** command has failed if the switch reboot process stops and displays the message "`Can not open file C:/version`" or the message "`Unable to determine size of C:/FW/filename`." If this happens, press **Return** to display the backup boot prompt, then see the "Troubleshooting Upgrade Problems" section in Appendix A, "Downloading and Installing Software Upgrades."

Step 9 To log in to the switch, enter the login name *cisco*, then enter the password *cisco*. For example:

```
Login: cisco
password:

unknown.7.PXM.a >
```

Note The default configured username and password sets are: user cisco, password *cisco;* user service, password *serviceuser;* and user superuser, password *superuser.*

Note If the switch has not fully started and is operating in init state (which is also called stage 1 CLI mode), an i appears in the switch prompt: unknown.7.PXM45.i>. In this mode, you can only log in with the user ID and password supplied with the switch, and a limited set of commands are available for troubleshooting. If you log in during init state and the card progresses to the active or standby state, the card will log out the init state user and prompt you to log in again. At this point, you can log in as a configured user with the corresponding password.

Note The number 7 in the switch prompt indicates that you are managing the PXM45 in slot 7. If you are managing the PXM45 in slot 8, the switch prompt displays the number 8.

The switch does not display the password during login. When login is complete, the switch prompt appears.

The switch prompt for PXM45 and AXSM cards uses the following format:

```
nodename.slot.cardtype.state>
```

Table 2-1 describes the components in the CLI prompt.

Table 2-1 CLI Prompt Components

Component	Description
nodename	The *nodename* is the name of the node. When a new switch starts up, the node name is set to "unknown." To change the name, see the "Setting and Viewing the Switch Name" section later in this chapter.
slot	The *slot* number indicates the physical slot in which the card you are configuring is installed. For most switch configuration procedures, configure the switch using the PXM45 cards in slots 7 and 8. For many line and trunk configuration procedures, you need to modify service modules (such as the AXSM card), which are installed in the other slots.
cardtype	The *cardtype* identifies the model of the card, such as PXM or AXSM.
state	The card *state* is active (a), standby (s), or init (i). Cards are labeled as *init* while they are initializing during switch startup.

Note The prompt for RPM cards uses a different format and displays only the name assigned to the router on the card. For example, `Router>`. This switch prompt comes from the Cisco IOS CLI that runs on the card.

Tip To make it easier to identify the RPM cards in your switch, choose card names that identify the switch and slot that hosts the card. You can set the card or router name in global configuration mode with the **hostname** command.

After initialization, the PXM45 card in the initialized slot becomes active. If a second PXM45 is installed in the other slot, the active PXM45 initiates a runtime firmware load on the other slot. After the runtime firmware loads on the nonactive PXM45, the card enters standby mode, ready to take control if the active card fails.

After you log in, the switch maintains your session for the default period of 10 minutes (600 seconds) after the last keystroke is entered. If the session is idle longer than 600 seconds, the session is terminated.

Tip To restart an automatically terminated session, press **Return**. The switch will prompt you for a login name and password.

Step 10 To change the session time-out period, enter the **timeout** command as follows:

```
unknown.7.PXM.a > timeout <seconds>
```

Replace *seconds* with the number of seconds you want the session to remain active before it times out. The maximum value is 600. To disable time-out, enter 0 seconds. The switch uses the new timeout value until you terminate the session. Each time a new session is started, the timout value returns to the default value, 600 seconds.

Once you have completed the procedure above, you have established a CLI management session. You can use a CLI management session to configure or monitor the switch.

Starting a CLI Management Session After Initialization

After initialization, you can terminate and start sessions at any time using the terminal or workstation connection to the CP port, which was described in the previous section.

Tip The switch also supports several other types of management connections, including remote connections. For instructions on supporting and starting other types of CLI management sessions, see Appendix C, "Supporting and Using Additional CLI Access Options."

Note Some or all of the commands discussed in this section require service-level or above user privileges. To access these commands, you must have debug (Service or Cisco level) privileges and passwords. Check with TAC for assistance.

To start a CLI management session at the CP port for switch configuration and monitoring, use the following procedure.

Step 1 Turn on the terminal or start the terminal session.

For instructions on preparing the terminal and the connection, see the previous section, "Initializing the Switch."

Step 2 If the `Login` prompt does not appear, press **Return**. The `Login` prompt comes from the switch and indicates that the terminal has successfully connected to the switch.

Step 3 When the `Login` prompt appears, enter the login name supplied with your switch, then enter the password for that login name. For example,

```
Login: superuser
password:

pop20one.7.PXM.a >
```

Note The default configured username and password sets are: user *cisco*, password *cisco*; user *service*, password *service*; user *superuser*, password *superuser*. To perform most of the procedures in this chapter, you will need to login as a user with SUPER_GP privileges or higher. The default username with these privileges is *superuser*.

Note If the switch has not fully started and is operating in init state (which is also called stage 1 CLI mode), an i appears in the switch prompt: unknown.7.PXM45.i>. In this mode, you can only log in with the user name *cisco* and the password *cisco*, and a limited set of commands are available for troubleshooting. If you log in during init state and the card progresses to the active or standby state, the card will log out the init state user and prompt you to log in again. At this point, you can log in as a configured user with the corresponding password.

The switch does not display the password during login. When login is complete, the switch prompt appears.

The switch prompt for PXM45 and AXSM cards uses the following format:

nodename.slot.cardtype.state>

Table 2-1 describes the components in the switch prompt.

Note The switch prompt for RPM cards uses a different format and displays only the name assigned to the router on the card. For example: `Router>`.

After you log in, the switch maintains your session for 10 minutes (600 seconds) after the last keystroke is entered. If the session is idle longer than 600 seconds, the session is terminated.

Tip To restart an automatically terminated session, press **Return**. The switch will then prompt you for a login name and password.

Step 4 To change the session time-out period, enter the **timeout** command as follows:

```
unknown.7.PXM.a > timeout <seconds>
```

Replace *seconds* with the number of seconds you want the session to remain active before it times out. The maximum value is 600. To disable timeout, enter 0 seconds. The switch uses the new timeout value until you terminate the session. Each time a new session is started, the timeout value returns to the default value, 600 seconds.

Once you have completed the procedure above, you have established a CLI management session. You can use a CLI management session to configure or monitor the switch.

Ending a CLI Management Session

CLI management sessions terminate automatically after the configured idle time. The default idle time is 600 seconds (10 minutes) and can be changed with the **timeout** command. To manually end a CLI management session, enter the **bye** or **exit** command.

Note The **bye** and **exit** commands end the CLI session. They do not terminate the terminal session. For instructions on terminating the terminal session, refer to the manuals for your terminal or terminal emulation program.

To restart the session after entering the **bye** or **exit** command, press **Return**, and the switch will prompt you for a username and password.

Entering Commands at the Switch Prompt

The commands in the switch operating system are associated with the cards that are installed in the switch. Before you execute a command, you must select a card that supports the command. The switch displays the currently selected card in the switch prompt. For example, the following switch prompt shows that the PXM45 card in slot 7 is selected:

```
mgx8850a.7.PXM.a >
```

To select another card in the switch, enter the following command:

```
mgx8850a.7.PXM.a > cc <slotnumber>
```

Replace *slotnumber* with the slot number of the card you want to manage. Table 2-2 lists the valid slot numbers for each card type.

Table 2-2 Valid Slot Numbers for Each Card Type

Card Type	Valid Slot Numbers MGX 8850	Valid Slot Numbers MGX 8950
PXM45	7 and 8	7 and 8
AXSM/A	1–6 and 9–14	1–6 and 11–16
AXSM/B	1–6 and 9–14	1–6 and 11–16
AXSM-E	1–6 and 9–14	1–6 and 11–16
AXSM-32-E	1–6 and 9–14	1–6 and 11–16
FRSM12	1–6 and 9–14	1–6 and 11–16
RPM	1–6 and 9–14	1–6 and 11–16

After you enter the **cc** command to change cards, verify that you are managing the correct card by viewing the slot number that is shown in the switch prompt. The following example shows the prompt for an AXSM card in slot 9:

```
mgx8850a.9.AXSM.a >
```

If you have trouble entering a command, look at the switch prompt to see if you have selected the correct card and type for the command. The following example shows the response to an unrecognized command:

```
mgx8850a.9.AXSM.a > dspdate
ERR: unknown command: "dspdate"
```

The **dspdate** command must be run on a PXM45 card. It is not recognized by an AXSM card.

Tip The command examples in this book include the switch prompt so that you can verify which card types support specific commands.

The default switch configuration allows you to enter command abbreviations. Because the **help** command is the only command that begins with **he**, you can use the abbreviated **he** command to display help. The following example demonstrates that the switch recognizes partial commands and displays long reports one page at a time.

```
mgx8850a.7.PXM.a > he

    Available commands
    ------------------
    ?
    abortallsaves
    abortofflinediag
    abortrev
    actaudit
    addaddr
    addcontroller
    addfltset
    addlink
    addlnloop
    addlpback
    addpnni-node
    addpnni-summary-addr
    addpnport
    addprfx
    addred
    addserialif
    addtrapmgr
    adduser

Type <CR> to continue, Q<CR> to stop:
```

Tip To disable the command abbreviation feature, enter the **cnfcmdabbr** command. To display the current setting for this option, enter the **dspcmdabbr** command.

Notice the last line of the help command display. Because the help report is too long to appear on one screen, it is displayed in pages. Press **Return** to display the next page or type **q** and press **Return** to cancel the report display.

The following example demonstrates what can appear when a command is entered at the wrong card prompt.

```
mgx8850a.9.AXSM.a > dspcds
ERR: incorrect number of parameters: (not enough)
Syntax: dspcdsct <bw|gen|cosb|vcThr|cosThr>

        bw|gen|cosb|vcThr|cosThr -- bw: Bandwidth parameters
                  gen: policing and CAC parameters
                 cosb: cosb parameters
                vcThr: vc threshold parameters
               cosThr: cosb threshold parameters
```

In the example above, the **dspcds** command is entered at the AXSM card prompt, but this command is not supported on the AXSM card (although the **dspcd** command is). Because the command is not recognized, the switch matches it to a command that is supported, which is the **dspcdsct** command. Because the command was entered without parameters, the switch displays an error message and the correct format for entering the **dspcdsct** command.

Whenever the switch displays an error message, be sure to check the spelling of the command, the parameters entered with the command, and the prompt at which the command was entered.

Getting Command Help

The following sections describe how to display the following types of command help:

- Available commands
- Available commands with additional information on access levels and logging
- Command syntax and parameters

Displaying Command Lists

The commands you can use to manage the switch are determined by your user name, which is configured for a particular access level. User names and access levels are described in more detail in "Configuring User Access," which appears later in this chapter. To display a list of all the commands available to the username you used at log in, enter the **help** command as follows:

```
mgx8850a.7.PXM.a > help
```

To display a list of commands that include a common set of characters, enter a question mark and the common set of characters, as shown in the following example:

```
mgx8850a.7.PXM.a > ? ip

    Available commands
    ------------------
    cliPlugin
    cliPlugout
    cnfifip
    cnfilmiproto
    cnftrapip
    delifip
    dspifip
    dspipconntask
    dspipif
    dspipifcache
    dsptrapip
    ipifconfig
    pntracevsipkt
```

Displaying Detailed Command Lists

Detailed command lists display the following additional information for each command:

- The access level required to enter the command
- The card state in which the command can be entered
- Whether command entry is logged

Note To display detailed command lists, you must establish a session using a username with SERVICE_GP privileges or higher (access privileges are described in the "Configuring User Access" section later in this chapter). You can also find this information in the *Cisco MGX 8850, MGX 8950, and MGX 8830 Switch Command Reference (PXM45/B)*.

To enable detailed command lists, enter the **clidbxlevel** command as shown in the following example:

```
pop20two.7.PXM.a > clidbxlevel 1
Value of cliDbxLevel is now 1
```

After you enter this command, you can display detailed command lists by entering the **help** command as shown in the following example:

```
M8850_LA.7.PXM.a > ?

    Command          Access           Card         Log
    ---------------------------------------------------
    ?                ANYUSER          A|S|I         -
    abortallsaves    GROUP1           A             +
    abortofflinediag SERVICE_GP       A|S           -
    abortrev         SERVICE_GP       A|S           +
    actaudit         SUPER_GP         A             +
    addaddr          GROUP1           A             +
    addcontroller    SUPER_GP         A             +
    addfltset        GROUP1           A             +
    addlink          ANYUSER          A             -
    addlnloop        ANYUSER          A             +
    addlpback        GROUP1           A             -
    addpnni-node     SUPER_GP         A             +
    addpnni-summary-addr SUPER_GP         A             +
    addpnport        GROUP1           A             +
    addprfx          GROUP1           A             +
    addred           SUPER_GP         A             +
    addserialif      SUPER_GP         A             -
    addtrapmgr       SUPER_GP         A             +
    adduser          GROUP1           A             +

Type <CR> to continue, Q<CR> to stop:
```

Note After you enter the **clidbxlevel** command, the **help** command displays detailed reports for that session only. You can disable detailed reports by entering the **clidbxlevel 0** command. Every time you start a new session, detailed command lists are disabled.

The Access column shows the access level required to enter the command. Access levels are described in "Configuring User Access," which appears later in this chapter.

The Card column identifies the card states during which the command can be entered. Valid card states are active, standby, and init. Cards are labeled as *init* during switch startup. The options that appear in the Card column are described in Table 2-3.

If a plus symbol appears in the Log column, each successful execution of the command is logged. If a minus symbol appears in the column, the command is not logged.

Table 2-3 Card State Descriptions

Card State	Description
A	Command is supported when card state is active.
I	Command is supported when the card state is in init state.
S	Command is supported in standby state.

Displaying Command Syntax and Parameters

To display the syntax of a command, enter the command without any parameters. The following example shows the syntax report provided by the switch using the **addport** command.

```
pop20two.1.AXSM.a > addport
ERR: incorrect number of parameters: (not enough)
Syntax: addport "<ifNum> <bay.line> <guaranteedRate> <maxRate> <sctID> <ifType>
               [vpi]"
        If Number -- number between 1 and 60
        Line Number -- format bay.line
        Guaranteed virtual int. Rate -- rates in cells/sec:
        Max virtual int. Rate -- for OC48:between 50 and 5651320
                                 for OC12:between 50 and 1412830
                                 for OC3:between 50 and 353207
                                 for T3:between 50 and 96000(PLCP),104268(ADM)
                                 for E3:between 50 and 80000
        SctID  -- Port SCT Id between 0 and 255, for default file use 0
        IfType  -- 1: uni 2: nni 3: vnni
        vpiNum  -- vpi between 1 and 4095:
                         used for configuring interface as virtual trunk
```

When a parameter is shown between less-than (<) and greater-than (>) symbols, the parameter represents a variable that must be replaced by a value. The values are described below the command syntax.

When the parameter is shown between brackets ([]), it is an optional parameter. If you omit an optional parameter, most commands will use the last value defined for the option. If no value has been assigned to an option, the default value is used.

Note Some commands, such as **dspcd** and **saveallcnf**, do not require parameters, so entering the command without parameters executes the command.When you enter the **saveallcnf** command, which saves the current switch configuration to a file, the switch prompts you to confirm the save before execution begins. Whenever the switch prompts you to confirm a command, the command you are confirming is likely to change the switch configuration, reduce switch performance, or take a long time to execute.

Tip To see the syntax of a command that does not require parameters, enter the command with a parameter you know is incorrect. For example,

8850_NY.7.PXM.a > **dspcd** jim
ERR: Invalid Slot number specified
ERR: Syntax: dspcd ["slot_number"]
    slot number -- optional;

Configuring User Access

The usernames and passwords supplied with your switch provide access to all switch features, and they allow you to add and delete users and change user passwords.

When configuring user access for the switch, consider the following recommendations:

- Change the default passwords provided with your switch. These passwords are published on the Cisco website and enable anyone with local or remote network access to configure and manage your switch.
- Share the usernames and passwords with only one or two people.
- If usernames and passwords become common knowledge during the switch installation and configuration, change the passwords.
- If additional users need access to the switch, create usernames and passwords below the top levels so that these users cannot access or modify the top-level user information.

The following sections describe how to add users, change passwords for existing users, delete users, and recover the user *cisco* password.

Adding Users

The switch supports up to 50 users. When you add users, you must specify the following for each user:

- user name
- password
- access level

The user name and password identify the user and determine the user access level for switch management.

An access level must be assigned to a user when the user is added to the switch. The access levels listed in Table 2-4 are used throughout this guide to indicate the level of access required to execute a command or complete a procedure. These access levels are also called access privileges. If a user has access privileges at a lower level than a command requires, the user cannot execute the command. If the user has access privileges at the level required or at a higher level, the user can execute the command.

Table 2-4 User Access Levels

Access Level	Descriptions
CISCO_GP	This is the highest user access level. Users with this access level have complete access to all commands. There is only one user at the CISCO_GP level, and that username is <*cisco*>. The default password for user *cisco* is <*cisco*>. Again, Cisco Systems recommends that you change the default passwords when you install a switch. Users at the CISCO_GP access level can add users, delete users, change passwords, and change access levels for users at the following levels: SERVICE_GP, SUPERUSER_GP, GROUP1, and ANYUSER.
SERVICE_GP	This access level allows access to commands that update switch firmware, save and restore the switch configuration, and enable debugging. This access level also provides access to all commands in all lower access levels: SUPERUSER_GP, GROUP1, and ANYUSER. The default username is *service*. The default password is <*service*>. Users at the service access level can add users, delete users, change passwords, and change access levels for users at the following levels: SUPERUSER_GP, GROUP1, and ANYUSER.
SUPER_GP	This access level allows users to configure switch level parameters such as the node name, date, and interface IP addresses. Users at this level can also enable traces. This access level also provides access to all commands in all lower access levels: GROUP1 and ANYUSER. The default username is *superuser*, and the default password is <*superuser*>. Users at the superuser access level can add users, delete users, change passwords, and change access levels for users at the following levels: GROUP1 and ANYUSER.
GROUP1	This access level allows users to configure line and port level parameters and create SPVCs and Soft Permanent Virtual Paths (SPVPs). This access level also provides access to all commands at the ANYUSER access level. No default username and password is provided for this access level. Users at the GROUP1 access level can add users, delete users, and change passwords for users at the ANYUSER access level.
ANYUSER	This access level allows users to run display and status commands that display the switch configuration and operational status. No default username and password is provided for this access level.

Note Earlier releases of the Cisco MGX 8850 software supported users at levels Group 2 through Group 5. These user levels have been removed from the software. If you upgrade a switch that has users configured at these levels, the user level for the affected users will change to Group 1 level access during the upgrade.

To add a user to the switch, use the following procedure.

Step 1 Establish a CLI management session with GROUP1 privileges or higher. To add a user at a specific access level, you must log in as a user with a higher access level.

Step 2 Enter the following command after the switch prompt:

```
mgx8850a.7.PXM.a >adduser <username> <accessLevel>
```

Enter the *username* using 1 to 12 alphanumeric characters. Specify the access level by entering one of the levels defined in Table 2-4.

Note The access levels are case-sensitive and must be entered as shown in Table 2-4. Also, you cannot add users at access levels that are equal to or above your own access level.

If you enter the command correctly, the switch prompts you for a password.

Step 3 Enter a password, using 5 to 15 characters.

Step 4 When prompted, enter the password a second time to validate the previous entry.

This step completes the addition of the new user.

Step 5 To display the new user in a list of all users, enter the command **dspusers**.

Tip To determine which commands are available at a particular access level, log in to the switch as a user at that access level, then enter the **help** command.

Step 6 To test the username, enter the **bye** command, then log in as the new user.

Tip If you forget which username you used to log in, enter the **whoami** command. This command displays the username, access level, and access method (for example, Telnet) for the current session.

Changing Your Own User Password

Use the **cnfpasswd** command to change your own password.

Note The **cnfuser** command allows you to change another user password if you have the correct access privileges. The next section describes how to use the **cnfuser** command.

To change your own password with the **cnfpasswd** command, use the following procedure.

Step 1 Establish a CLI management session using the username for which you want to change the password.

Step 2 Enter the following command after the switch prompt:

```
mgx8850a.7.PXM.a >cnfpasswd
```

Step 3 When prompted, enter your current password.

Step 4 When prompted, enter a new password, using 5 to 15 characters.

Step 5 When prompted, enter the new password a second time to validate the correct entry.

This completes the change of password.

Step 6 To test the new password, enter the **bye** command, then log in using the new password.

Changing User Access Levels and Passwords with cnfuser

After you create a user, you can change that user’s access level or password using the **cnfuser** command.

Note You can also change your own user password with the **cnfpasswd** command as described in the preceding section.

To change the user level or password of a switch user, use the following procedure.

Step 1 Establish a CLI management session. Use either the username for which you want to change the password, or a username with privileges at least one level higher than those of the user whose password you want to change.

Step 2 Enter the following command after the switch prompt:

```
mgx8850a.7.PXM.a >cnfuser -u <username> [-p <password>] [-l <accessLevel>]
```

Replace *username* with the name of the user for whom you are making the change.

If you are changing the password, specify the **-p** option and enter a password containing from 5 to 15 characters. If you are changing the user access level, specify the **-l** (lowercase L) option and enter the appropriate access level as shown in Table 2-4.

Note You can change passwords and access levels only for users who have privileges lower than the username you used to log in.

Step 3 To test a new password, enter the **bye** command, then log in using the new password.

Step 4 To verify a user access level change, enter the **dspusers** command.

The **dspusers** command displays all the usernames and the access levels for each user as shown in the following example:

```
pop20two.7.PXM.a > dspusers

    UserId        AccessLevel
    -------------------------
    cisco         CISCO_GP
    service       SERVICE_GP
    superuser     SUPER_GP
    username       GROUP1
```

Deleting Users

To delete a user, use the following procedure.

Step 1 Establish a CLI management session using a username with privileges at least one level higher than that of the user you want to delete.

Step 2 Enter the following command after the switch prompt:

```
mgx8850a.7.PXM.a >deluser <username>
```

Enter the *username* using from 1 to 12 alphanumeric characters.

This step completes the deletion of a user.

Step 3 To verify the user has been deleted, enter the command **dspusers**.

Resetting the Default User Password

If you lose or forget your password for switch access, you should ask a user with a higher access level to reset your password using the **cnfuser** command. If you do not have any passwords for any access levels, you can use the following password recovery procedure to reset the password for user *cisco*. This procedure resets the user *cisco* password to the default password *cisco*, and leaves all other passwords unchanged. (You can change the other passwords with the **cnfuser** command after logging in as user cisco.)

Note This feature can be disabled using the **cnfpswdreset** command as described in the next section. You can determine if this feature is enabled or disabled by logging in as a user at any level and entering the **dsppswdreset** command.

Step 1 Establish a physical connection to the switch through the Console Port (CP) connector on the PXM UI-S3 card.

Caution Anyone with physical access to the switch Console Port can reset the password, deny access to other users, and reconfigure the switch. To prevent unauthorized switch access and configuration, the switch should be installed in a secure area.

Step 2 When the login prompt appears, press **ESC, CTRL-Y** to reset the password.

Step 3 Log in using username *cisco* and the password *cisco*.

Step 4 To maintain switch security after resetting the cisco user password, change the password using the **cnfpasswd** command.

Enabling and Disabling the User cisco Password Reset

If the switch you are managing is in an insecure area, you might want to disable the user password reset feature. Otherwise, anyone with physical access to the switch Console Port can reset the password, deny access to other users, and reconfigure the switch. This feature can be enabled again at a later date if you know the user name and password for a user at the SERVICE_GP privilege level or higher.

To enable or disable the password reset feature, use the following procedure.

Step 1 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 2 To disable password reset, enter the **cnfpswdreset off** command.

Step 3 To enable password reset, enter the **cnfpswdreset on** command.

Step 4 To view the status of this feature, enter the **dsppswdreset** command.

Setting and Viewing the Switch Name

The switch name identifies the switch you are working on, which is important when you are managing multiple switches. The current switch name appears in the CLI prompt when you are managing PXM45 cards and service modules.

To change the switch name, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Enter the following command after the switch prompt:

```
unknown.7.PXM.a > cnfname <node name>
```

Enter up to 32 characters for the new node name. Be sure to use the correct case because the node name is case-sensitive. For example:

```
unknown.7.PXM.a > cnfname pop20two
This node name will be changed to pop20two. Please Confirm
cnfname: Do you want to proceed (Yes/No)? y
cnfname: Configured this node name to pop20two Successfully.

pop20two.7.PXM.a >
```

The new name appears immediately in the next CLI prompt.

Viewing and Setting the Switch Date and Time

The switch date and time is appended to event messages and logs. To assure that events are properly time stamped, use the following procedure to view and change the date and time.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 To view the current switch date and time, enter the following command after the switch prompt:

```
mgx8850a.7.PXM.a > dspdate
```

Step 3 To change the switch date, enter the following command:

```
mgx8850a.7.PXM.a > cnfdate <mm/dd/yyyy>
```

Step 4 To change the time zone, enter the following command:

```
mgx8850a.7.PXM.a > cnftmzn <timezone>
```

Replace <*timezone*> with one of the parameter values listed in Table 2-5. If your switch is located outside the Western Hemisphere, select **GMT** and use the next step to specify an offset from GMT. If your switch is located in the Western Hemisphere choose the appropriate option from Table 2-5. *Daylight* times are adjusted by one hour in the fall and spring for daylight savings. *Standard* times are not adjusted.

Table 2-5 Time Zones for cnftmzn Command

Parameter Value	Time Zone
CDT	Central Daylight Time
CST	Central Standard Time
EDT	Eastern Daylight Time
EST	Eastern Standard Time
GMT	Greenwich Mean Time
MDT	Mountain Daylight Time
MST	Mountain Standard Time
PDT	Pacific Daylight Time
PST	Pacific Standard Time

Step 5 To configure an offset from GMT, enter the following command:

```
mgx8850a.7.PXM.a > cnftmzngmt <timeoffsetGMT>
```

Replace <*timeoffsetGMT*> with the offset in hours from GMT. Enter a number from -12 to +12.

Step 6 To change the switch time, enter the following command:

```
mgx8850a.7.PXM.a > cnftime <hh:mm:ss>
```

Replace <*hh*> with the hour of the day (0 to 23), *mm* with the minute of the hour (0 to 59), and *ss* with the number of seconds in the minute (0 to 59).

Step 7 To verify the new date and time settings, enter the **dspdate** command.

Configuring PNNI Node Parameters

The Cisco MGX 8850 and Cisco MGX 8950 switches support many PNNI configuration commands. This section describes how to configure the basic PNNI configuration parameters for the switch. Chapter 6, "Managing PNNI Nodes and PNNI Routing," describes how to manage PNNI after you have brought up the PNNI node.

Caution It is important to configure the PNNI node parameters before you start creating SPVCs as described in Chapter 6, "Provisioning AXSM Communication Links." If you create SPVCs using the default PNNI node parameters and later change those parameters, the node will advertise the old ATM address information for the older SPVCs as well as the new ATM address information. To keep PNNI running at maximum efficiency, set the PNNI node parameters to the proper values before creating SPVCs, or delete and recreate old SPVCs after making PNNI node parameter updates.

Adding the PNNI Controller

The PNNI controller simplifies switch configuration by using PNNI protocol to discover call routes in an ATM network. Without the PNNI controller, each route through the network would have to be defined manually or through an alternative routing mechanism such as MPLS. Chapter 6, "Managing PNNI Nodes and PNNI Routing," provides more information on PNNI. This section describes how to enable and configure the PNNI controller for the switch.

Note Before entering the following command, you must log in as a user with SUPER_GP privileges or higher.

To enable and configure the PNNI controller, enter the following command:

```
8850_LA.7.PXM.a > addcontroller <cntrlrId> i <cntrlrType> <slot> [cntrlrName]
```

Table 2-6 describes the parameters for the **addcontroller** command.

Tip Remember to include the **i** option, which identifies the controller as an internal controller.

Table 2-6 Parameter Descriptions for the addcontroller Command

Parameter	Values	Descriptions
cntrlrId	2	Controller ID. Enter **2** to specify a PNNI controller or **3** to specify an MPLS controller. The MPLS controller is introduced in the next section.
—	i	Enter the value **i**. This parameter will support additional values in future releases.
cntrlrType	2 or 3	Controller type. Enter **2** to specify a PNNI controller or **3** to specify an MPLS controller. The MPLS controller is introduced in the next section.

Table 2-6 Parameter Descriptions for the addcontroller Command (continued)

Parameter	Values	Descriptions
slot	7	Slot number for PXM45 cards. Enter **7** or **8** to specify the PXM45 as the PNNI controller host.
cntrlrName	text	Controller name. This parameter is optional. You can enter a text name to identify the PNNI or MPLS controller. If the name you want to use includes one or more space characters, enclose the entire name with quotation marks.

To display the PNNI controller configuration, enter the **dspcontrollers** command:

```
8850_LA.7.PXM.a > dspcontrollers
```

Setting the PNNI Level and Peer Group ID

The *Cisco MGX and SES PNNI Network Planning Guide* provides guidelines for selecting a PNNI level and peer group ID. To set these parameters in the switch, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Disable PNNI node operation by entering the following command:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> -enable false
```

The *node-index* uniquely defines a logical PNNI node within the switch. Initially, there is just one logical PNNI node at the lowest PNNI level, and its index number is 1. If you add a higher level logical node to the physical node, the first higher level will be numbered two, and the next higher level will be number three. Additional levels receive sequentially higher node index numbers.

During this general node configuration, you are setting the PNNI level and peer group ID for the lowest PNNI level, so replace *node-index* with 1.

Note For instructions on creating logical nodes above the lowest PNNI level, see Chapter 6, "Managing PNNI Nodes and PNNI Routing."

Step 3 Change the PNNI address with the **cnfpnni-node** command as follows:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> [-pgId level:peerGroupID]
```

To configure the lowest PNNI level, replace <*node-index*> with 1. Replace *level* with the PNNI level you want to use, and replace *peerGroupID* with the 13-byte peer group ID you want to use. For example,

```
8850_LA.7.PXM.a > cnfpnni-node 1 -pgId 56:47.00.9181.0000.0100.0000.0000.00
```

Step 4 Enable PNNI node operation by entering the following command:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> -enable true
```

Replace *node-index* with the value you used when disabling and reconfiguring the PNNI node.

Step 5 To display the PNNI node configuration, enter the **dsppnni-node** command:

```
8850_LA.7.PXM.a > dsppnni-node
```

The switch displays a report similar to the following:

```
8850_LA.7.PXM.a > dsppnni-node

node index: 1                      node name: 8850_LA
   Level..............        56     Lowest.............      true
   Restricted transit..      off     Complex node........      off
   Branching restricted       on
   Admin status........       up     Operational status..       up
   Non-transit for PGL election..       off
   Node id..............56:160:47.00918100000000001a531c2a.00001a531c2a.01
   ATM address..........47.00918100000000001a531c2a.00001a531c2a.01
   Peer group id.........56:47.00.9181.0000.0100.0000.0000.00
```

Setting the PNNI Node Address

The *Cisco MGX and SES PNNI Network Planning Guide* provides guidelines for setting the PNNI node address, which is also the switch ATM address. To set the PNNI node address, use the following procedure.

Caution When installing new switches, you can assume that each default node address will be unique. When PXM45 cards are repaired or moved between switches, however, it is possible that two switches will start using the same node address. To prevent duplicate node addresses, use your own address plan, and check the node address whenever a PXM45 card is replaced or moved from one switch to another.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Disable PNNI node operation by entering the following command:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> -enable false
```

The *node-index* uniquely defines a logical PNNI node within the switch. Initially, there is just one logical PNNI node at the lowest PNNI level, and the index number is 1. If you add a higher level logical node to the physical node, the first higher level will be numbered two, and the next higher level will be number three. The node index is a reference to a particular logical PNNI process in the node.

The PNNI address is configured at the lowest PNNI level, so replace <*node-index*> with 1.

Note The PNNI address you enter at the lowest level is used for all levels. PNNI increments the selector byte (which is the last byte) of the ATM address to represent logical nodes at higher PNNI levels.

Step 3 Change the PNNI address with the **cnfpnni-node** command as follows:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> [-atmAddr atm-address]
```

To configure the lowest PNNI level, replace <*node-index*> with 1; replace *atm-address* with the 20-byte ATM address you want to use. For example:

```
8850_LA.7.PXM.a > cnfpnni-node 1 -atmAddr 47.00918100000100001a531c2a.00001a531c2a.01
```

Note The ATM address in the example above shares the same seven most-significant bytes (level 56 peer groups use the first 7 bytes) as the peer group ID example in the previous section, so PNNI can advertise only the peer group ID outside of the peer group. If the ATM address and peer group ID used different prefixes, PNNI would have to advertise the node ATM address and the peer group ID. The ATM address should conform to your ATM address plan. For more information, refer to the *Cisco MGX and SES PNNI Network Planning Guide*.

Tip Use the Copy and Paste functions of the terminal session software to copy an existing ATM address into the command line. Then you can use your editing keys to make changes to the address before pressing **Enter** to execute the command.

Step 4 Enable PNNI node operation by entering the following command:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> -enable true
```

Replace <*node-index*> with the value you used when disabling and reconfiguring the PNNI node.

Step 5 To display the PNNI node configuration, enter the command:

```
8850_LA.7.PXM.a > dsppnni-node
```

The switch displays a report similar to the following:

```
8850_LA.7.PXM.a > dsppnni-node

node index: 1                     node name: 8850_LA
   Level...............        56     Lowest..............      true
   Restricted transit..       off     Complex node........       off
   Branching restricted        on
   Admin status........        up     Operational status..        up
   Non-transit for PGL election..       off
   Node id...............56:160:47.00918100000000001a531c2a.00001a531c2a.01
   ATM address...........47.00918100000100001a531c2a.00001a531c2a.01
   Peer group id.........56:47.00.9181.0000.0100.0000.0000.00
```

Setting the PNNI Node ID

The PNNI node ID appears in many CLI displays, including the **dsppnni-node** command display. The default node ID is *PNNIlevel*:160:*defaultATMaddress*. If you change the PNNI level or the node ATM address, you should also change the node ID so that the node ID represents the correct PNNI level and ATM address. This will make it easier to identify the node when using CLI commands because most CLI commands reference the node ID, not the node ATM address. For example:

```
8850_LA.7.PXM.a > dsppnni-link

node index   : 1
Local port id:   16848897          Remote port id:   16848897
Local Phy Port Id: 1:2.1:1
   Type. lowestLevelHorizontalLink     Hello state....... twoWayInside
   Derive agg...........         0     Intf index...........  16848897
   SVC RCC index........         0     Hello pkt RX.........     22366
                                       Hello pkt TX.........     22178
```

```
Remote node name.......8950_SF
Remote node id.........56:160:47.00918100000100036b5e31b3.00036b5e31b3.01
Upnode id..............0:0:00.000000000000000000000000.000000000000.00
Upnode ATM addr........00.000000000000000000000000.000000000000.00
Common peer group id...00:00.00.0000.0000.0000.0000.0000.00
```

In the example above, there is no reference to the ATM address for the remote switch named 8950_SF. However, if the node ID is set to match the ATM address, it will be easy to determine the ATM address of a remote switch.

To set the PNNI node ID, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Disable PNNI node operation by entering the following command:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> -enable false
```

The *node-index* uniquely defines a logical PNNI node within the switch. Initially, there is just one logical PNNI node at the lowest PNNI level, and its index number is 1. If you add a higher level logical node to the physical node, the first higher level will be numbered two, and the next higher level will be number three. The node index is a reference to particular logical PNNI process in the node.

The PNNI node ID is configured at the lowest PNNI level, so replace <*node-index*> with 1.

Note The node ID you enter at the lowest level is used for all levels. PNNI uses a modified version of the lowest level node ID for upper level nodes.

Step 3 Change the PNNI node ID with the **cnfpnni-node** command as follows:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> [-nodeId PNNIlevel:160:atm-address]
```

To configure the lowest PNNI level, replace <*node-index*> with 1. Replace *PNNIlevel* with the lowest PNNI level, and replace *atm-address* with the 20-byte ATM address you want to use. For example:

```
8850_LA.7.PXM.a > cnfpnni-node 1 -nodeId
56:160:47.00918100000100001a531c2a.00001a531c2a.01
```

Step 4 Enable PNNI node operation by entering the following command:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> -enable true
```

Replace <*node-index*> with the value you used when disabling and reconfiguring the PNNI node.

Step 5 To display the PNNI node configuration, enter the command:

```
8850_LA.7.PXM.a > dsppnni-node
```

The switch displays a report similar to the following example:

```
8850_LA.7.PXM.a > dsppnni-node

node index: 1                     node name: 8850_LA
   Level...............         56     Lowest..............      true
   Restricted transit..        off     Complex node........       off
   Branching restricted         on
   Admin status........         up     Operational status..        up
   Non-transit for PGL election..        off
   Node id...............56:160:47.00918100000100001a531c2a.00001a531c2a.01
   ATM address...........47.00918100000100001a531c2a.00001a531c2a.01
   Peer group id.........56:47.00.9181.0000.0100.0000.0000.00
```

Setting and Viewing the SPVC Prefix

The *Cisco MGX and SES PNNI Network Planning Guide* provides guidelines for selecting the SPVC prefix. The SPVC prefix is the ATM prefix that PNNI advertises for all SPVCs and soft permanent virtual paths (SPVP) on this node. The ATM address for each SPVC and SPVP is the combination of the SPVC prefix and a port identification number.

You can configure one SPVC node prefix per node. To set the SPVC prefix, use the following procedure.

Note Although the SPVC prefix is set to match the first 13 bytes of the PNNI node address by default, changing either the PNNI node address or the SPVC prefix has no effect on the other setting. If the PNNI node ATM address and the SPVC prefix do not match, the switch advertises both prefixes instead of just one, and this advertising takes additional bandwidth.

Note You can change the SPVC prefix only when no SPVCs or SPVPs have been defined. Once an SPVC has been defined, you must delete all SPVCs before you can change the SPVC prefix. For information on deleting SPVCs, see the "Deleting SPVCs and SPVPs" section in Chapter 6, "Provisioning AXSM Communication Links."

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Enter the following command to display the current SPVC prefix:

```
8850_LA.7.PXM.a > dspspvcprfx
```

The switch response is similar to the following:

```
8850_LA.7.PXM.a > dspspvcprfx
SPVC Node Prefix: 47.00918100000000001a531c2a
```

Tip If the SPVC prefix begins with 47.009181000000, the SPVC prefix is probably set to the default value. To display the current PNNI node address, enter the **dsppnni-node** command.

Step 3 To change the SPVC prefix, enter the following command:

```
8850_LA.7.PXM.a > cnfspvcprfx -prfx <prefix>
```

Replace *prefix* with the 13-byte prefix you want to use. For example:

```
8850_LA.7.PXM.a > cnfspvcprfx -prfx 47.00918100000100001a531c2a
```

Note The SPVC prefix in the example above matches the first 13 bytes of the node PNNI address example presented in the previous section, so PNNI can advertise one prefix to support both SVC connections through the node and SPVCs. If the SPVC prefix does not match the corresponding bytes in the ATM address, PNNI advertises two prefixes instead of one. The SPVC prefix should conform to your ATM address plan. For more information, refer to the *Cisco MGX and SES PNNI Network Planning Guide*.

Note The SPVC node prefix for each node must be unique within the network.

Step 4 Verify the correct entry of the prefix by entering the **dspspvcprfx** command.

Displaying PNNI Summary Addresses

After you configure the PNNI level, peer group ID, ATM address, and SPVC prefix, it is wise to review the summary addresses the node will advertise. If all PNNI parameters are properly coordinated, the node should display a single summary address that represents all PNNI destinations in that node. To display the summary addresses, enter the **dsppnni-summary-addr** command as shown in the following example:

```
8850_LA.7.PXM.a > dsppnni-summary-addr

node index: 1
   Type.............    internal     Suppress.............   false
   State............ advertising
   Summary address........47.0091.8100.0001.0000.1a53.1c2a/104
```

The example above is coordinated with the examples in the previous sections, so just one PNNI summary address is broadcast to the peer group. The following example demonstrates what happens when the node ATM address and the SPVC prefix are not coordinated:

```
8850_LA.7.PXM.a > dsppnni-summary-addr

node index: 1
   Type.............    internal     Suppress.............   false
   State............ advertising
   Summary address........47.0091.8100.0000.0000.1a53.1c2a/104

node index: 1
   Type.............    internal     Suppress.............   false
   State............ advertising
   Summary address........47.0091.8100.0001.0000.1a53.1c2a/104
```

```
8850_LA.7.PXM.a > dsppnni-node

node index: 1                      node name: 8850_LA
   Level..............        56     Lowest.............      true
   Restricted transit..       off    Complex node........      off
   Branching restricted       on
   Admin status........       up     Operational status..       up
   Non-transit for PGL election..      off
   Node id...............56:160:47.00918100000000001a531c2a.00001a531c2a.01
   ATM address...........47.00918100000000001a531c2a.00001a531c2a.01
   Peer group id.........56:47.00.9181.0000.0100.0000.0000.00



8850_LA.7.PXM.a > dspspvcprfx
SPVC Node Prefix: 47.00918100000100001a531c2a
```

In the example above, the node ATM address does not conform to the peer group ID or the SPVC prefix, so it must be advertised in addition to the SPVC prefix.

Configuring the MPLS Controller

The MPLS controller manages MPLS communications through the switch. Typically, the MPLS controller is used with a PNNI controller. Both MPLS and PNNI controllers can be used on the same line.

Note Before entering the following command, you must log in as a user with SUPER_GP privileges or higher.

To enable and configure the MPLS controller, enter the following command:

```
mgx8850a.7.PXM.a > addcontroller <cntrlrId> i <cntrlrType> <lslot> [cntrlrName]
```

Table 2-6 describes the parameters for the **addcontroller** command.

Tip Remember to include the **i** option, which identifies the controller as an internal controller.

To display the MPLS controller configuration, enter the **dspcontrollers** command:

```
mgx8850a.7.PXM.a > dspcontrollers
```

Configuring Clock Sources

The "Network Clock Source Plan" section in Chapter 1, "Preparing for Configuration," introduces Building Integrated Timing System (BITS) clock sources and provides guidelines for developing a network clock source plan. When the network clock source plan requires BITS clock sources on the switch, you can use the procedure in this section to configure the BITS clock connections.

Figure 2-2 shows how BITS clock sources connect to the PXM45-UI-S3 back card.

The PXM45-UI-S3 clock source ports can be used to receive clock signals from either T1 or E1 lines; the card does not support both line types simultaneously. These clock ports support stratum levels 1 to 3.

Note When using an external clock source and redundant PXM45 cards, use a Y-cable to connect that clock source to the same clock port on both PXM45 cards. Otherwise, the clock source is available to only one of the PXM45 cards.

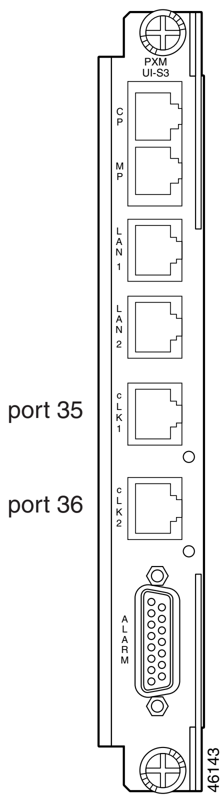
Release 3 of the MGX switches supports two forms of network clock source configuration:

- manual
- NCDP

Both types of network clock configuration are described in the sections that follow.

Note When NCDP is enabled, your manual configuration is disabled, and vice versa. When you disable NCDP, your node reverts back to any manual clock configuration that was previously done on the node. If you re-enable NCDP after disabling it, your switch will remember your last NCDP configuration and use that unless you change it.

Figure 2-2 BITS Clock Source Ports on PXM45-UI-S3 Back Card



Manually Configuring BITS Clock Sources

The following procedure describes how to configure the switch to use clock sources on the BITS clock ports.

Note For instructions on configuring the switch to use a clock source on an AXSM line, see the "Configuring AXSM Line Clock Sources" section in Chapter 6, "Provisioning AXSM Communication Links."

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 To configure a primary or secondary BITS clock source, enter the **cnfclksrc** command:

```
mgx8850a.7.PXM.a > cnfclksrc <priority> [shelf.]slot.port -bits {e1|t1} [-revertive
{enable|disable}]
```

Table 2-7 describes the parameters for this command.

Table 2-7 Parameter Descriptions for cnfclksrc Command when Used for PMX 45

Parameter	Values	Descriptions
priority	primary or secondary	Replace <*priority*> with the type of clock source, which is either primary or secondary. The default is primary.
shelf	1	The <*shelf*> value is always 1 and is optional.
slot	7	The <*slot*> number is 7 for the BITS clocks regardless of whether the active PXM45 is in slot 7 or 8
port	35 to 36	The <*port*> number identifies the port on the PXM45-UI-S3 to which the BITS clock is connected and the type of line connected. Select the appropriate port number from the following: • Port 35 = T1 or E1 clock connected to upper clock port • Port 36 = T1 or E1 clock connected to lower clock port
-bits	e1 or t1	The **-bits** option specifies whether the clock source line is an E1 or T1.
-revertive	enable or disable	The **-revertive** option enables or disables the revertive feature for the BITS clock sources.

Step 3 To configure an additional BITS clock source, repeat Step 2 using the correct parameters for the additional source.

Step 4 To display the clock source configuration, enter the **dspclksrcs** command, which is described in the "View the Configured Clock Sources" section in Chapter 7, "Switch Operating Procedures.".

Note The PXM45 provides a revertive function that can apply when the primary clock source fails. A failure is a loss of the primary clock source after the switch has locked on to that clock source. If the primary clock source recovers and revertive mode is enabled, the switch automatically reverts to the primary source

The following command example shows how to configure a primary E1 external clock source at the upper connector of the PXM45-UI-S3. Note the command punctuation.

```
mgx8850a.7.PXM.a > cnfclksrc primary 7.35 -bits e1
```

The next example configures a primary network clock source and enables the revertive option.

```
mgx8850a.7.PXM.a > cnfclksrc primary 7.36 -bits e1 -revertive enable
```

The last example disables the revertive function for an E1 BITS clock.

```
mgx8850a.7.PXM.a > cnfclksrc primary 7.36 -bits e1 -revertive disable
```

Enabling NCDP on a Node

Use the following procedure to enable NCDP on you network.

Step 1 Enter the **cnfncdp** [*options*] command to enable NCDP on the node, set timer values, and specify the number of nodes in the clocking domain.

```
M8850_LA.8.PXM.a > cnfncdp -distributionMode 1 -maxNetworkDiameter 30 -hello 300 -holdtime 300 -topoChangeTimer 300
```

Table 2-8 describes the options available for the **cnfncdp** command.

Table 2-8 cnfncdp Command Parameters

Parameter	Description
-distributionMode	The clock distribution mode is either NCDP or manual. If manual, use the **cnfclksrc** and its related commands for synchronization. Possible entries: 1 for NCDP or 2 for manual clocking Default = manual (2)
-maxNetworkDiameter	Maximum network diameter measured in hops. This is the maximum length of the spanning tree, in the range from 3 through 200. Default = manual (20)
-hello	Hello time Interval, in milliseconds, between PDUs. The range is from 47 through 60000 milliseconds. Default = 500 milliseconds

Table 2-8 cnfncdp Command Parameters (continued)

Parameter	Description
-holdtime	Specifies the time interval, in milliseconds, between each PDU configuration. The range is from 47 through 60000 milliseconds. Default = 500 milliseconds
-topoChangeTimer	Time interval, in milliseconds, for which the topology change notification bit will be sent in the the configuration PDUs. The range is from 47 through 60000 milliseconds. Default = 500 milliseconds

Step 2 Enter the **dspncdp** command to verify that the NCDP parameters were set properly.

```
M8850_LA.8.PXM.a > dspncdp
Distribution Mode                : ncdp
Node stratum level               : 3
Max network diameter             : 30
Hello time interval              : 300
Holddown time interval           : 300
Topology change time interval    : 300
Root Clock Source                : 255.255
Root Stratum Level               : 3
Root Priority                    : 128
Last clk src change time         : Feb 21 2002 14:16:11
Last clk src change reason       : Topology Changed
```

Once NCDP is enabled on your node, the best clock source and second best clock source are automatically selected and distributed to all nodes in the network with NCDP enabled. If no previous NCDP clock configuration has been done, NCDP selects a root clock source will come from an internal oscillator. If you want to specify the root clock source to come from an external source, use the **cnfncdpclksrc** command as described in the "Configuring an NCDP Clock Source" section in Chapter 7, "Switch Operating Procedures."

Note Cisco recommends using an external clock source instead of the internal oscillator.

Note If you want to specify the root clock source to come from an external source before you enable NCDP, use the **cnfncdpclksrc** <*portid*> **0** command as described in the "Configuring an NCDP Clock Source" section in Chapter 7, "Switch Operating Procedures." If you run **cnfncdpclksrc** <*portid*> **0** before you enable NCDP with the cnfncdp command, the root clock source will be the external clock you configured, instead of the internal oscillator.

BITS clock configuration is automatically done when you enable NCDP on your node. If you wish to change the BITS clock selected by NCDP, use the cnfncdpclksrc command, as described in the "Configuring an NCDP Clock Source" section in Chapter 7, "Switch Operating Procedures."

Setting the LAN IP Addresses

The switch uses two types of IP addresses for Ethernet LAN access:

- Boot IP addresses
- Node or disk IP addresses

The following sections describe how to set these addresses. For information on how the switch uses these addresses and how to choose the addresses, see Chapter 1, "Guidelines for Creating an IP Address Plan."

Note The switch also supports IP addresses for dial-in and ATM inband access. For more information on these access options, see Appendix C, "Supporting and Using Additional CLI Access Options."

Setting the Boot IP Address

The boot IP address is the LAN port IP address a PXM45 card uses when it first starts up. If the switch cannot fully start, this IP address can be used to access the switch in boot mode. When the switch is properly configured (with different addresses set for the boot IP and LAN IP addresses), the boot IP address can also be used to access the standby PXM45 card directly, while the disk IP address can be used to access the active PXM45.

Note Because the LAN IP address is stored on the PXM45 hard disk and is not used until after the runtime software loads, Cisco recommends that the boot IP address be set in every switch. This enables switch management over Ethernet when the boot software has loaded.

To set the boot IP address, use the **bootChange** command, which allows you to also define a remote boot location, a default gateway IP address, and a username and password for the remote boot location.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Enter the **bootChange** command as shown in the following example.

```
pop20two.7.PXM.a > bootChange

'.' = clear field;  '-' = go to previous field;  ^D = quit

boot device          : lnPci
```

In this example, the switch is waiting for you to take action on the boot device option. Enter a period <.> to clear the current value (lnPci), enter minus <-> to go back to the previous field (although this is the first of 14 fields), or enter **Return** to accept the current value and display the next option.

The following example shows all options.

```
8850_NY.7.PXM.a > bootChange

'.' = clear field;  '-' = go to previous field;  ^D = quit

boot device          : lnPci
processor number     : 0
host name            :
file name            :
inet on ethernet (e) : 172.29.52.6
inet on backplane (b):
host inet (h)        : 0.0.0.0
gateway inet (g)     : 172.29.52.1
user (u)             :
ftp password (pw) (blank = use rsh):
flags (f)            : 0x0
target name (tn)     : ??????????
startup script (s)   :
other (o)            :
```

Note The only two options that must be set to support the boot IP address are **inet on ethernet (e)** and **gateway inet**. The **bootchange** command operates only on the active card. If you are having trouble bringing up a standby card, you can set the boot IP address with the **sysChangeEnet** command as described in the "Troubleshooting Upgrade Problems" section in Appendix A, "Downloading and Installing Software Upgrades," If you set the boot IP address on the standby card with the **sysChangeEnet** command and it is different from the IP address set with the **bootchange** command on the active card, the standby card will start using the boot IP address set with the **bootchange** command when it reaches standby mode.

Step 3 Accept, clear, or change option values as necessary until the **inet on ethernet** option appears. Table 2-9 defines the options that you can change.

Table 2-9 bootChange Command Option Descriptions

Option	Description
boot device	The lnPci value selects an external server as the boot source when the boot or runtime software is not found on the PXM45 hard disk.
processor number	Do not change this option.
host name	The host name identifies an external server that has switch boot and runtime software.
file name	This option defines the path and filename of the runtime software on a remote server.
inet on ethernet	This option selects the boot IP address and network mask for the PXM45 you are configuring. (This PXM45 is identified in the switch prompt.) Enter the address and mask in the format: a.b.c.d:w.x.y.z, where a.b.c.d is the IP address and w.x.y.z is the network mask.
inet on backplane	Do not change this option.
host inet	The host inet option defines the IP address for the external server that has boot and runtime software for the switch.
gateway inet	The gateway inet option identifies the IP address for the default gateway on the subnet that hosts the switch.

Table 2-9 bootChange Command Option Descriptions (continued)

Option	Description
user	This option defines a username that can be used for FTP access to the boot and runtime software files on a remote server.
ftp password	This option identifies a password that can be used for FTP access to the boot and runtime software files on a remote server.
flags	Do not change this option.
target name	Do not change this option.
startup script	Do not change this option.
other	Do not change this option.

Step 4 Set the **inet on ethernet (e)** option to the boot IP address value you want to use. The following example shows how the command appears when a new value has been entered:

```
inet on ethernet (e) : 172.29.52.88 172.29.52.8:255.255.255.0
```

The 172.29.52.88 address appeared as part of the prompt. If no address had been previously defined, no text would appear after the colon. In this example, 172.29.52.108 is the new boot IP address, and 255.255.255.0 is the new network mask.

Step 5 Set the **gateway inet** option to the IP address for the default gateway on the subnet that hosts the switch.

Step 6 Accept, clear, or change values as necessary until the switch prompt reappears.

Step 7 To verify the new values you have set, enter the **bootChange** command and press **return** for each of the 14 values.

Note Cisco MGX 8850 software releases prior to Release 2.0(12) supported unique addresses for the boot IP addresses on the PXM45 cards in slots 7 and 8. This approach required three unique Ethernet IP addresses per switch. Beginning with Release 2.0(12), the **bootChange** command automatically sets the boot IP addresses for both slots 7 and 8 to the same IP address.

Setting the LAN or Disk IP Address

A local LAN connection extends switch management to all workstations that have connectivity to the LAN to which the switch is connected. Figure 2-1 shows the hardware required for a local LAN connection.

Figure 2-3 Hardware Required for Local LAN Connections

Note The PXM UI-S3 card shown in Figure 2-1 has two LAN ports. In the current software release, only the LAN 1 connector is enabled for LAN communications. Communication through the LAN 2 connector is disabled.

Before you can manage the switch through the PXM45 LAN port, you must first assign an IP address to the LAN port. The LAN or disk IP address is the IP address for the Ethernet LAN port on the active PXM45. The LAN IP address is also called the Disk IP address because it is stored on the PXM45 hard disk. However, the IP address for the Maintenance Port is also stored on the hard disk and must be different, so this section refers to this address as the LAN IP address.

Note To enable LAN connectivity to the active PXM45 card, you must configure a LAN IP address. The boot IP address cannot be used to access an active PXM45 card. If you want to assign only one IP address for LAN access, assign the same IP address to the boot and LAN IP addresses.

Tip The significance of the Disk IP address for the LAN Port is that it is stored on the hard disk and is not available until the runtime software is loaded on the PXM45 card and the card is active. To access the LAN port over Ethernet when a PXM45 is operating in boot or standby mode over, you must use the Boot IP address.

The LAN IP address can be set to match the boot IP address when only one IP address is available, or it can be set to a unique address to support access to the standby PXM45 during regular operation. For more information on how the boot and LAN IP addresses are used, see Chapter 1, "Guidelines for Creating an IP Address Plan."

To set the IP address, enter the **ipifconfig** command as described in the following procedure.

Step 1 Establish a CLI management session using a username with SUPER_GP privileges. The default user name and password for this level are *superuser*, *superuser*.

Step 2 Verify that the IP address is not already configured by entering the **dspipif** command, as shown in the following example.

```
mgx8850a.7.PXM.a> dspipif lnPci0
```

Note If you omit the **lnPci0** option, the switch displays the configuration for all switch IP interfaces: the ATM interface (atm0), the PXM45 LAN port interface (lnPci0), and the PXM45 maintenance port interface (sl0). Note that the address for each interface must be unique.

In the IP Interface Configuration Table, look for an Internet address entry under the lnPci entry. If an IP address is configured, you can use that address and skip the rest of this procedure. However, if the address has not been entered or is incompatible with your network, you must configure a valid IP address as described in the next step.

Note If you are using CWM to manage your network, the IP address 10.0.XX cannot be used as the LAN address for the switch.

Step 3 To set the IP address for the LAN port, enter the **ipifconfig** command using the following format:

```
mgx8850a.7.PXM.a> ipifconfig lnPci0 <IP_Addr> <netmask Mask>
```

Replace <*IP_Addr*> with the IP address you want this port to use, and replace <*Mask*> with the network mask used on this network.

Note There are other options for the **ipifconfig** command, and you can set one or more options simultaneously. Any options you do not define in a command remain unchanged. For more information on this command, refer to *Cisco MGX 8850, MGX 8950, and MGX 8830 Switch Command Reference (PXM45/B)*.

Step 4 Verify that the IP address changes by entering the **dspipif** command. For example,

```
M8850_LA.7.PXM.a > dspipif lnPci0
M8850_LA                        System Rev: 02.01   Sep. 17, 2001 17:39:15 PST
MGX8850                                             Node Alarm: NONE
IP INTERFACE CONFIGURATION
--------------------------------------------------------------------
lnPci (unit number 0):
     Flags: (0x63) UP BROADCAST ARP RUNNING
     Internet address: 172.29.52.88
     Broadcast address: 172.29.255.255
     Netmask 0xffff0000 Subnetmask 0xffffff00
     Ethernet address is 00:00:1a:53:1c:2a
     Metric is 0
     Maximum Transfer Unit size is 1500
     1174481 packets received; 516574 packets sent
     502 input errors; 3 output errors
     3 collisions
     DISK IP address: 172.29.52.88
```

Tip You can view the IP routing table for the switch by entering the **routeShow** command. To manage routes in the routing table, you can use the following commands: **routeAdd**, **routeDelete**, **routeNetAdd**, and **routestatShow**.

Starting a CLI Session Through the LAN Port

The switch includes a Telnet server process that you can use to connect to and manage the switch. Before you can establish a CLI Telnet session, you must set up the hardware for your access method and assign the appropriate boot and LAN IP addresses.

After the LAN IP interface has been configured and a physical path established to the MGX 8850, you can start a CLI session using a workstation with a Telnet client program. To establish a CLI management session, use the following procedure.

Step 1 Start the Telnet client program on a LAN workstation with a command similar to the following example:

```
C:>telnet ipaddress
```

Replace *ipaddress* with the appropriate LAN IP address as follows:

- Active PXM45 card: enter the LAN IP address.
- Standby PXM45 card: enter the Boot IP address (requires separate addresses for boot and LAN IP addresses).
- PXM45 in backup boot mode: enter the Boot IP address.

Note The Telnet program on your workstation may require a different start up and connection procedure. For instructions on operating your Telnet program, refer to the documentation for that product.

Tip If you have trouble accessing the switch from a workstation, use the PING program at the workstation to test communications. For example, **ping 10.10.10.1**.

You can also view the IP routing table for the switch by entering the **routeShow** command. To manage routes in the routing table, you can use the following commands: **routeAdd**, **routeDelete**, **routeNetAdd**, and **routestatShow**.

Step 2 If the Login prompt does not appear, press **Enter**.

The Login prompt comes from the switch and indicates that the workstation has successfully connected to the switch.

Step 3 When the Login prompt appears, enter the user name provided with your switch and press **Enter**.

Step 4 When the password prompt appears, enter the password provided with your switch and press **Enter**.

After you successfully log in, a prompt appears that is similar to the prompt in the following example:

```
mgx8850a.7.PXM.a >
```

Configuring for Network Management

The Cisco MGX 8850 and Cisco MGX 8950 switches include a Simple Network Management Protocol (SNMP) agent that you can configure for communications with a network management station such as Cisco WAN Manager (CWM) or a third-party SNMP manager. When configured for SNMP management, the switch accepts configuration commands from management stations and sends status and error messages to the management station.

Typically, CWM operates on a workstation that is connected to an IP network; CWM uses IP over ATM connections to connect to the Cisco MGX 8850 and Cisco MGX 8950 switches. For information on establishing this type of access, see the "Setting Up ATM WAN Connections" section in Appendix C, "Supporting and Using Additional CLI Access Options."

To support the auto-discovery feature of CWM, ILMI should be brought up on all links between the CWM workstation and the switches it will manage. For information on bringing up ILMI, see the "Configuring ILMI on a Port" section in Chapter 6, "Provisioning AXSM Communication Links."

The rest of this section describes the following procedures:

- Configuring the SNMP Trap Source IP Address
- Configuring the SNMP Manager Destination IP Address
- Configuring the Community String and General Switch Information

Configuring the SNMP Trap Source IP Address

The SNMP trap source IP address is sent to SNMP managers, such as CWM, in the SNMP trap Packet Data Unit (PDU). This IP address identifies the source of the trap and can be used by the SNMP manager to access the remote SNMP agent. This address must be configured to enable communications with an SNMP manager.

Note If the trap manager IP address is not set, CWM will reject traps from the switch.

The switch can communicate with an SNMP manager over the LAN or ATM IP interfaces. In some installations, the LAN IP interface will be used for CLI management and the ATM IP interface will be used for SNMP management. When you select the SNMP trap manager IP address, you must select the correct interface address.

To define the SNMP trap manager IP address, enter the **cnftrapip** command as follows:

```
8850_LA.7.PXM.a > cnftrapip <ipaddress>
```

The IP address should match the LAN IP address or the ATM interface IP address. For information on setting and viewing the LAN IP address, see "Setting the LAN IP Addresses," which appears earlier in this chapter. For information on setting and viewing the ATM interface IP address, see "Setting Up ATM WAN Connections" in Appendix C, "Supporting and Using Additional CLI Access Options."

Configuring the SNMP Manager Destination IP Address

The SNMP Manager destination IP address identifies the IP address of an SNMP manager, such as CWM, to which the switch sends SNMP traps. If you are using CWM to manage the switch, CWM will automatically configure the destination IP address on the switch. If you are using another SNMP manager, you can configure the destination IP address with the **addtrapmgr** command as follows:

```
8850_LA.7.PXM.a > addtrapmgr <ipaddress> <port>
```

Replace *ipaddress* with the IP address of the SNMP manager, and replace *port* with the UDP port number assigned to that manager. For more information on the SNMP manager IP address, refer to the SNMP manager documentation.

Configuring the Community String and General Switch Information

To configure information about a switch in the local SNMP agent, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 To define the SNMP password for network management, enter the following command:

```
mgx8850a.7.PXM.a > cnfsnmp community [password]
```

If the *password* parameter is not specified, the password becomes <private>.

Step 3 To define a text string that identifies the location of the switch to the management station, enter the following command:

```
mgx8850a.7.PXM.a > cnfsnmp location [location]
```

If the *location* parameter is not specified, the location is set to null (no text). The location value is sent to SNMP managers when information is requested about the sysLocation MIB object.

Step 4 To define a text string that identifies a person to contact regarding issues with this switch, enter the following command:

```
mgx8850a.7.PXM.a > cnfsnmp contact [contact]
```

If the *contact* parameter is not specified, the location is set to null (no text). The contact value is sent to SNMP managers when information is requested about the sysContact MIB object.

Step 5 To display the SNMP agent configuration, enter the **dspsnmp** command. The command display appears similar to the following example:

```
pop20two.7.PXM.a > dspsnmp
pop20two                        System Rev: 02.01   Dec. 28, 2000 20:37:18 PST
MGX8850                                             Node Alarm: NONE

Community:               private
System Location:         Pubs Lab
System Contact           Jim
```

Verifying the Hardware Configuration

Before you can configure your switch, you need to collect information about the cards and software installed on the switch. You need to enter this information during the various configuration tasks. Table 2-10 shows the information you need and serves as a worksheet where you can enter this information.

The following procedure describes how to display the configuration information you need to enter in this table. It also describes how to verify that the correct upper and lower back cards are installed for each front card.

Step 1 Establish a configuration session at any access level.

Step 2 To display a list of all the cards installed in the switch, enter the **dspcds** command after the switch prompt:

```
mgx8850a.7.PXM.a > dspcds
```

The switch displays a report similar to the following

```
M8850_LA.7.PXM.a > dspcds
M8850_LA                        System Rev: 02.01   Sep. 27, 2001 20:20:05 PST
Chassis Serial No:   SAA03230375 Chassis Rev: B0     GMT Offset: -8
                                                    Node Alarm: NONE
Card  Front/Back          Card           Alarm      Redundant   Redundancy
Slot  Card State          Type           Status     Slot        Type
---   ----------          --------       --------   -------     -----

01    Active/Active       AXSM_4OC12     NONE       NA          NO REDUNDANCY
02    Empty               ---            ---        ---         ---
03    Active/Active       AXSM_16T3E3    NONE       NA          NO REDUNDANCY
04    Empty               ---            ---        ---         ---
05    Active/Active       AXSME_2OC12    NONE       NA          NO REDUNDANCY
06    Active/Active       AXSM_16OC3_B   NONE       NA          NO REDUNDANCY
07    Active/Active       PXM45          NONE       08          PRIMARY SLOT
08    Standby/Active      PXM45          NONE       07          SECONDARY SLOT
09    Active/Active       RPM_PR         NONE       NA          NO REDUNDANCY
10    Empty               ---            ---        ---         ---
11    Empty               ---            ---        ---         ---
12    Empty               ---            ---        ---         ---
13    Empty               ---            ---        ---         ---
14    Empty               ---            ---        ---         ---
```

Note If an RPM card is installed in the switch and does not appear in the **dspcds** command display, the RPM card has not loaded the boot or runtime IOS software. In this case, you need to visually locate the RPM cards by looking for them in the switch.

Table 2-10 Hardware Configuration Worksheet

Card	Front Card Type	Upper Back Card	Lower Back Card	Primary Software Version	Boot Firmware Version	Redundant Slot	Redundancy Type
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

Step 3 In the worksheet in Table 2-10, write down the following information for each card:

- Front card type (from the “Card Type” column)
- Redundant slot
- Redundancy type

Step 4 For each slot in which a card is installed, complete the following tasks:

a. Enter the **dspcd** command as follows:

```
mgx8850a.7.PXM.a > dspcd slot
```

The **dspcd** command displays information that is unique to a particular card. For PXM45 cards, the switch displays a report similar to the following example:

```
M8850_LA.7.PXM.a > dspcd 7
M8850_LA                        System Rev: 02.01   Sep. 27, 2001 20:21:48 PST
MGX8850                                             Node Alarm: NONE
Slot Number    7    Redundant Slot:  8

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      PXM45               UI Stratum3         PXM HardDiskDrive
Reserved Card:      PXM45               UI Stratum3         PXM HardDiskDrive
State:              Active              Active              Active
Serial Number:      SAK033600AN         SBK044200J8         SAK0403005Q
Prim SW Rev:        2.1(60)             ---                 ---
Sec SW Rev:         2.1(60)             ---                 ---
Cur SW Rev:         2.1(60)             ---                 ---
Boot FW Rev:        2.1(60)             ---                 ---
800-level Rev:      12                  A0                  06
800-level Part#:    800-05983-01        800-05787-02        800-05052-03
CLEI Code:          0000000000          BA7IBCLAAA          0000000000
Reset Reason:       On Reset From Shell
Card Alarm:         NONE
Failed Reason:      None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:
M8850_LA                        System Rev: 02.01   Sep. 27, 2001 20:21:48 PST
MGX8850                                             Node Alarm: NONE

Crossbar Slot Status:      Present

Alarm Causes
------------
    NO ALARMS
```

Tip The **dspcd** and **dspcds** commands are very similar, but they produce different reports. The **dspcd** command displays information about a specific card. The **dspcds** command displays summary information for all cards in the switch.

For AXSM cards, the switch displays a report similar to the following:

```
M8850_LA.7.PXM.a > dspcd 1
M8850_LA                        System Rev: 02.01   Sep. 27, 2001 20:24:09 PST
MGX8850                                             Node Alarm: NONE
Slot Number:   1    Redundant Slot: NONE

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      AXSM_4OC12          SMFIR_2_OC12        SMFIR_2_OC12
Reserved Card:      AXSM_4OC12          SMFIR_2_OC12        SMFIR_2_OC12
State:              Active              Active              Active
Serial Number:      SAK0350007N         SAK0346003F         SBK0406001V
Prim SW Rev:        2.1(60)             ---                 ---
Sec SW Rev:         2.1(60)             ---                 ---
Cur SW Rev:         2.1(60)             ---                 ---
Boot FW Rev:        2.1(60)             ---                 ---
800-level Rev:
800-level Part#:    800-05774-05        800-05383-01        800-05383-01
```

```
CLEI Code:          BAA1BADAAA          0000000000          BAI9ADTAAA
Reset Reason:       On Power up
Card Alarm:         NONE
Failed Reason:      None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:
M8850_LA                         System Rev: 02.01   Sep. 27, 2001 20:24:09 PST
MGX8850                                              Node Alarm: NONE

Crossbar Slot Status:      Present

Alarm Causes
------------
    NO ALARMS
```

b. In the worksheet in Table 2-10, write down the following information for each card:

- Upper back card type, which appears in the Upper Card column of the Inserted Card row.
- Lower back card type, which appears in the Lower Card column of the Inserted Card row.
- Primary software version, which appears in the Prim SW Rev row.
- Boot firmware version, which appears in the Boot FW Rev row.

Tip Another way to display a detailed report on a card is to enter the **cc** command to select the card, then enter the **dspcd** command without a slot number. However, the preferred method is to use the **dspcd** command with a slot number because this method can display information on a card when card errors prevent access through the **cc** command.

Step 5 After you have entered the required information for all cards in Table 2-10, use Table 2-11 to verify that each card is installed in a slot that supports that card type. You also need to verify that the correct back cards are installed for the corresponding front cards.

If any of the cards are installed incorrectly, refer to either the *Cisco MGX 8850 Hardware Installation Guide (PXM45/B and PXM1E)* or the *Cisco MGX 8950 Hardware Installation Guide* for instructions on installing the cards correctly.

Note The locations where the upper and lower back cards are installed are also called bays. Each slot has an upper and a lower bay for back cards.

Table 2-11 Valid Card Installation Options

Front Card Type	Description and Part No.	Back Card Types	Valid Back Card Bay Locations	MGX 8850 Valid Slot Numbers	MGX 8950 Valid Slot Numbers	Supports APS Connector
AUSM-8E1/B	8-port E1 ATM User Service Module MGX-AUSM-8E1/B	AX-RJ48-8E1 AX-R-RJ48-8E1 AX-R-SMB-8E1 AX-SMB-8E1	Upper and lower	1-6, 9-14, 17-22, 25-30		
AUSM-8T1/B	8 port T1 ATM User Service Module MGX-AUSM-8T1/B	AX-RJ48-8T1 AX-R-RJ48-8T1	Upper and lower	1-6, 9-14, 17-22, 25-30		
AXSM-1-2488	1 port OC-48/STM-16 **Note** No traffic shaping supported. AXSM-1-2488	SMFSR-1-2488 SMFLR-1-2488 SMFXLR-1-2488	Upper	1–6, 9–14	1–6, 11–16	Yes
AXSM-1-2488/B	1 port OC-48/STM-16 **Note** No traffic shaping supported. AXSM-1-2488/B	SMFSR-1-2488/B SMFLR-1-2488/B SMFXLR-1-2488/B	Upper	1–6, 9–14	1–6, 11–16	No
AXSM-2-622-E	2-port OC-12/STM-4 (622 Mbps)	SMFIR-1-622/C SMFLR-1-622/C	Upper	1–6, 9–14		Yes
AXSM-4-622	4-port OC-12	SMFIR-2-622 SMFLR-2-622	Upper and lower	1–6, 9–14	1–6, 11–16	Yes
AXSM-4-622/B	4-port OC-12	SMFIR-2-622/B SMFLR-2-622/B	Upper and lower	1–6, 9–14	1–6, 11–16	Yes
AXSM-8-155-E	8-port OC-3/STM-1 (155 Mbps)	MMF-4-155-MT/B SMFIR-4-155-LC/B SMFLR-4-155-LC/B SMB-4-155	Upper	1–6, 9–14		Yes
AXSM-16-155	16-port OC-3	MMF-8-155-MT MMF-8-155-MT/B SMFIR-8-155-LC SMFIR-8-155-LC/B SMFLR-8-155-LC SMFLR-8-155-LC/B	Upper and lower	1–6, 9–14	1–6, 11–16	Yes

Table 2-11 Valid Card Installation Options (continued)

Front Card Type	Description and Part No.	Back Card Types	Valid Back Card Bay Locations	MGX 8850 Valid Slot Numbers	MGX 8950 Valid Slot Numbers	Supports APS Connector
AXSM-16-155/B	16-port OC-3	SMB-4-155 MMF-8-155-MT/B SMFIR-8-155-LC/B SMFLR-8-155-LC/B	Upper and lower	1–6, 9–14	1–6, 11–16	Yes
AXSM-16-T3E3	16-port T3/E3	SMB-8-T3 SMB-8-E3	Upper and lower	1–6, 9–14	1–6, 11–16	Yes
AXSM-16-T3E3/B	16-port T3/E3	SMB-8-T3 SMB-8-E3	Upper and lower	1–6, 9–14	1–6, 11–16	Yes
AXSM-16-T3E3-E	16-port T3/E3	SMB-8-T3 SMB-8-E3	Upper and lower	1–6, 9–14	1–6, 11–16	Yes
AXSM-16-E1-E	16-port E1	SMB-8E1-Y	Upper	1–6, 9–14		
AXSM-16-T1-E	16-port T1 AXSM-E AXSM-16-T1-E	RJ48-8T1-Y	Upper and lower	1–6, 9–14		
AXSM-32-T3E3-E	32-port T1/E1	RJ48-16-T1/E1 MCC-16-E1	Upper and lower	1–6, 9–14		Yes
FRSM-12-T3E3-E	32-port T1/E1	RJ48-16-T1/E1 MCC-16-E1	Upper and lower	1–6, 9–14		Yes
FRSM-2CT3	2 port, channelized T3 Frame Relay Service Module MGX-FRSM-2CT3	MGX-BNC-2T3	Upper and lower	1-6, 9-14, 17-22, 25-30		
FRSM-2T3E3	2 port Frame Relay Service Module that supports T3 or E3 MGX-FRSM-2CT3	MGX-BNC-2T3 MGX-BNC-2E3 MGX-BNC-2E3A	Upper and lower	1-6, 9-14, 17-22, 25-30		
FRSM-8E1	8-port E1 Frame Relay Service Module AX-FRSM-8E1	AX-RJ48-8E1 AX-R-RJ48-8E1 AX-R-SMB-8E1 AX-SMB-8E1	Upper and lower	1-6, 9-14, 17-22, 25-30		
FRSM-8E1-C	8-port E1 Frame Relay Service Module, Channelized AX-FRSM-8E1-C	AX-RJ48-8E1 AX-R-RJ48-8E1 AX-R-SMB-8E1 AX-SMB-8E1	Upper and lower	1-6, 9-14, 17-22, 25-30		
FRSM-8T1	8-port T1 Frame Relay Service Module AX-FRSM-8T1	AX-RJ48-8T1 AX-R-RJ48-8T1	Upper and lower	1-6, 9-14, 17-22, 25-30		

Table 2-11 Valid Card Installation Options (continued)

Front Card Type	Description and Part No.	Back Card Types	Valid Back Card Bay Locations	MGX 8850 Valid Slot Numbers	MGX 8950 Valid Slot Numbers	Supports APS Connector
FRSM-8T1-C	8-port T1 Frame Relay Service Module, Channelized AX-FRSM-8T1-C	AX-RJ48-8T1 AX-R-RJ48-8T1	Upper and lower	1-6, 9-14, 17-22, 25-30		
FRSM-HS2	2 port Frame Relay Service Module with HSSI interfaces MGX-FRSM-HS2	MGX-SCSI2-2HSSI/B	Upper and lower	1-6, 9-14, 17-22, 25-30		
PXM45	Processor Switch Module PXM45	UI Stratum-3	Upper	7 and 8		
		PXM Hard Disk Drive	Lower			
PXM45/B	Processor Switch Module PXM45/B	UI Stratum-3	Upper	7 and 8		
		PXM Hard Disk Drive	Lower			
RPM-PR-256 RPM-PR-512	Route Processor Module RPM-PR-256 RPM-PR-512	MGX-RJ45-4E/B MGX-RJ45-FE MGX-MMF-FE	Upper and lower	1–6, 9–14	1–6, 11–16	
VISM-8E1	8-port E1 Voice Internetworking Service Module MGX-VISM-8E1	AX-RJ48-8E1 AX-R-RJ48-8E1 AX-R-SMB-8E1 AX-SMB-8E1	Upper and lower	1-6, 9-14, 17-22, 25-30		
VISM-8T1	8-port T1 Voice Internetworking Service Module MGX-VISM-8T1	AX-RJ48-8T1 AX-R-RJ48-8T1	Upper and lower	1-6, 9-14, 17-22, 25-30		
XM60	Switch Module 60 60 Gbps switch fabric	none	none		9, 10, 25, and 26	

CHAPTER 3

Preparing AXSM Cards and Lines for Communication

This chapter describes how to prepare AXSM cards and lines for physical connectivity to other switches. Chapter 6, “Provisioning AXSM Communication Links,” describes how to add ports and connections that support ATM communications across the cards and lines configured in this chapter.

This chapter provides a quickstart procedure for configuring AXSM cards and lines and describes the following procedures:

- Managing Firmware Version Levels for AXSM Cards
- Establishing Redundancy Between Two AXSM Cards
- Selecting and Viewing Service Class Templates
- Setting Up Lines
- Establishing Redundancy Between Two Lines with APS

Note For the purposes of this document, the term “AXSM” refers to all types of AXSM cards. In this document, the term AXSM/A distinguishes the first release of AXSM from AXSM/B cards.

Configuration Quickstart

The quickstart procedure in this section provides a summary of the tasks required to prepare AXSM cards and lines for configuration as ATM trunks and lines. This procedure is provided as an overview and as a quick reference for those who already have configured Cisco MGX 8850 and Cisco MGX 8950 switches.

	Command	Purpose
Step 1	*username* <*password*>	Start a configuration session. **Note** To perform all the procedures in this quickstart procedure, you must log in as a user with GROUP1 privileges or higher.
Step 2	**setrev** <*slot*> <*version*> Related commands: **dspcds**	Initialize AXSM cards by setting the firmware version level for each AXSM card. See the "Managing Firmware Version Levels for AXSM Cards" section, which appears later in this chapter.
Step 3	**addred** <*options*>	Define which AXSM cards are operating as redundant cards. See the "Establishing Redundancy Between Two AXSM Cards" section, which appears later in this chapter.
Step 4	**cnfcdsct** <*sctid*> Related commands: **dspcd** **dspsctchksum <path name>**	Applies ATM communications parameters from a preconfigured Service Class Template (SCT) file to all communications between the card you are configuring and the other AXSM cards in the switch. For PNNI communications, use SCT ID 2 or 4 for policing applications and use SCT ID 3 or 5 for non-policing applications. If MPLS will be used on any card link, use SCT ID 4 for policing applications and use SCT ID 5 for non-policing applications. See the "Selecting and Viewing Service Class Templates" section, which appears later in this chapter.
Step 5	**upln** <*bay.line*> Related commands: **dsplns** **dspln** -*type* <*bay.line*>	Bring up and configure lines. This step establishes physical layer connectivity between two switches. See the "Setting Up Lines" section, which appears later in this chapter.
Step 6	**cnfln** <*options*> Related commands: **dsplns** **dspln** -*type* <*bay.line*>	Configure lines. See the "Configuring SONET Lines" section, which appears later in this chapter.
Step 7	**addapsln** <*workingIndex*> <*protectIndex*> <*archmode*>	Configure a redundant relationship between two AXSM lines. See the "Establishing Redundancy Between Two Lines with APS" section, which appears later in this chapter.

Managing Firmware Version Levels for AXSM Cards

The AXSM cards within the switch run two types of firmware: boot firmware and runtime firmware. The boot firmware provides the startup information the card needs. The boot firmware is installed on the board at the factory. The runtime firmware controls the operation of the card after startup. The runtime firmware file is stored on the PXM45 hard disk.

After the AXSM cards are installed in the switch, you must specify the correct runtime firmware version for each card before the switch can begin using the card. The following sections explain how to

- Locate the cards that need to have the firmware version level set
- Set the firmware version levels for cards in the switch
- Verify the firmware version levels being used by cards

Locating Cards that Need the Firmware Version Set

When an AXSM card is installed and the firmware version needs to be set, the System Status LED on the front of the card blinks red. The **dspcds** command shows that the card status is Failed. Other events can display these symptoms, but if the AXSM card is new, the problem is probably that the firmware version number has not been set. To locate the cards that need to have the firmware version set, use the following procedure.

Step 1 Establish a CLI management session at any access level.

Step 2 To display a list of all the cards in the switch, enter the **dspcds** command.

```
8850_NY.7.PXM.a > dspcds
```

The following example shows the display for this command. The card state for the card in slot 3 is listed as Failed/Active. This is how a card appears when the runtime firmware version has not been selected.

```
M8850_LA.7.PXM.a > dspcds
M8850_LA                         System Rev: 02.01   Sep. 27, 2001 20:33:09 PST
Chassis Serial No:   SAA03230375 Chassis Rev: B0     GMT Offset: -8
                                                     Node Alarm: NONE
Card  Front/Back          Card           Alarm      Redundant   Redundancy
Slot  Card State          Type           Status     Slot        Type
---   ----------          --------       --------   -------     -----

01    Active/Active       AXSM_4OC12     NONE       NA          NO REDUNDANCY
02    Empty               ---            ---        ---         ---
03    Failed/Active       AXSM_16T3E3    NONE       NA          NO REDUNDANCY
04    Empty               ---            ---        ---         ---
05    Active/Active       AXSME_2OC12    NONE       NA          NO REDUNDANCY
06    Active/Active       AXSM_16OC3_B   NONE       NA          NO REDUNDANCY
07    Active/Active       PXM45          NONE       08          PRIMARY SLOT
08    Standby/Active      PXM45          NONE       07          SECONDARY SLOT
09    Active/Active       RPM_PR         NONE       NA          NO REDUNDANCY
10    Empty               ---            ---        ---         ---
11    Empty               ---            ---        ---         ---
12    Empty Reserved               ---            ---        ---         ---
13    Empty Reserved               ---            ---        ---         ---
14    Empty               ---            ---        ---         ---
```

Note the slot number, card type, and redundancy type for each card that needs to have the firmware version set. You will need this information to activate these cards as described in the next section, "Initializing AXSM Cards."

Note If any AXSM card displays the Active/Active card state, you do not have to set the runtime firmware version for that card. Also, the Front/Back Card State for slots 12 and 13 show Empty Reserved. These slots will support service modules in a future release.

Initializing AXSM Cards

Before an AXSM card can operate, it must be initialized in a switch slot. The initialization process defines the AXSM runtime software version that will run on the card and identifies the slot in which the card operates. To initialize an AXSM card, use the following procedure.

Note The PXM45 card supports a maximum of 99 lines on the switch. As you add AXSM cards, verify that the line count for all AXSM cards does not exceed this number.

Step 1 If you have not already done so, determine the software version number for the card by referring to the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3*.

Tip If you have trouble locating the runtime firmware version level, use the filenames on the PXM45 hard disk to determine the level. For more information, see the "Determining the Software Version Number from Filenames" section in Chapter 7, "Switch Operating Procedures."

Step 2 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 3 To set the firmware revision level for a card, enter the **setrev** command.

```
mgx8850a.7.PXM.a > setrev <slot> <version>
```

Note Each card should be initialized only once with the **setrev** command. The only other time you should enter the **setrev** command is to initialize cards after the configuration has been cleared with the **clrallcnf** command.

Replace <*slot*> with the card slot number and replace <*version*> with the software version number. For example,

```
mgx8850a.7.PXM.a > setrev 1 2.1(60)
```

After you enter the **setrev** command, the System status LED blinks red until the firmware load is complete, and then it changes to non-blinking green.

Step 4 To verify the activation of a card for which the status was previously listed as Failed/Empty, enter the **dspcds** command. The status should change to Active/Active.

Verifying Card Firmware Version Levels

When you are having problems with your switch, or when you have taken delivery of a new switch but delayed installation, it is wise to verify the firmware versions installed on the switch. If newer versions of this firmware are available, installing the updated firmware can prevent switch problems.

To verify the firmware versions in use on your switch, use the following procedure.

Step 1 To display the software revision status of all the cards in a switch, enter the **dsprevs** command as follows:

```
M8850_LA.7.PXM.a > dsprevs
M8850_LA                         System Rev: 02.01   Sep. 27, 2001 20:36:15 PST
MGX8850                                              Node Alarm: NONE
Physical  Logical   Inserted       Cur Sw              Boot FW
Slot      Slot      Card           Revision            Revision
--------  -------   --------       --------            --------

01        01        AXSM_4OC12     2.1(60)             2.1(60)
02        02        ---            ---                 ---
03        03        AXSM_16T3E3    2.1(60)             2.1(60)
04        04        ---            ---                 ---
05        05        AXSME_2OC12    2.1(60)             2.1(60)
06        06        AXSM_16OC3_B   2.1(60)             2.1(60)
07        07        PXM45          2.1(60)             2.1(60)
08        07        PXM45          2.1(60)             2.1(60)
09        09        RPM_PR         ---                 ---
10        10        ---            ---                 ---
11        11        ---            ---                 ---
12        12        ---            ---                 ---
13        13        ---            ---                 ---
14        14        ---            ---                 ---
```

Step 2 To see the software revision levels for a single card, enter the **dspversion** command as follows:

```
8850_NY.1.AXSM.a > dspversion

  Image Type   Shelf Type    Card Type        Version   Built On
  ----------   ----------   ----------   ------------   ------------
     Runtime          MGX         AXSM     2.1(0)       Feb 13 2001, 07:47:35
        Boot          MGX         AXSM     2.1(0)       -
```

Step 3 Another way to see the software revision levels for a single card is to enter the **dspcd** command as follows:

```
M8850_LA.7.PXM.a > dspcd 1
M8850_LA                         System Rev: 02.01   Sep. 27, 2001 20:38:48 PST
MGX8850                                              Node Alarm: NONE
Slot Number:   1    Redundant Slot: NONE

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      AXSM_4OC12          SMFIR_2_OC12        SMFIR_2_OC12
Reserved Card:      AXSM_4OC12          SMFIR_2_OC12        SMFIR_2_OC12
State:              Active              Active              Active
Serial Number:      SAK0350007N         SAK0346003F         SBK0406001V
Prim SW Rev:        2.1(60)             ---                 ---
Sec SW Rev:         2.1(60)             ---                 ---
Cur SW Rev:         2.1(60)             ---                 ---
Boot FW Rev:        2.1(60)             ---                 ---
800-level Rev:
800-level Part#:    800-05774-05        800-05383-01        800-05383-01
CLEI Code:          BAA1BADAAA          0000000000          BAI9ADTAAA
Reset Reason:       On Power up
Card Alarm:         NONE
Failed Reason:      None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:
```

Step 4 Using the **dsprevs** and **dspcd** commands, complete the hardware and software configuration worksheet in Table 2-10.

Step 5 Compare the versions you noted in Table 2-10 with the latest versions listed in the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3*.

Step 6 If the switch requires software updates, upgrade the software using the instructions in Appendix A, "Downloading and Installing Software Upgrades."

Establishing Redundancy Between Two AXSM Cards

To establish redundancy between two AXSM cards, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 If you have not done so already, set the firmware version for both cards, as described in the "Initializing AXSM Cards" section.

Step 3 Enter the **dspcds** command to verify that both AXSM cards are in the Active state.

Step 4 Enter the **addred** command as follows:

```
pop20one.7.PXM.a > addred <redPrimarySlotNum> <redSecondarySlotNum> <redType>
```

Replace <*redPrimarySlotNum*> with the slot number of the AXSM card that will be the primary card, and replace <*redSecondarySlotNum*> with the slot number of the secondary AXSM card. Replace <*redType*> with the number 1, which selects 1:1 Y cable redundancy. Although the online help lists other redundancy types, 1:1 Y cable redundancy is the only type supported on AXSM cards in this release.

Note One of the two cards can be configured before redundancy is established. If this is the case, the configured card should be specified as the primary card. Redundancy cannot be established if the secondary card has active lines. If the secondary card has active lines, you must delete all ports and down all lines before it can be specified as a secondary card.

Tip If the switch displays the message, `ERR: Secondary cd is already reserved`, then lines are already in use on the specified secondary card. Enter the **dnln** command to bring down these lines before re-entering the **addred** command.

Step 5 To verify that the redundancy relationship is established, enter the **dspred** command as shown in the following example:

```
pop20two.7.PXM.a > dspred
pop20two                          System Rev: 02.01   Feb. 06, 2001 11:24:53 PST
MGX8850                                               Node Alarm: NONE
Primary  Primary   Primary    Secondary  Secondary  Secondary    Redundancy
SlotNum   Type      State      SlotNum     Type       State         Type
-------  -------  ---------   ---------  ---------  ---------    ----------
  1      AXSM      Active        2        AXSM       Standby        1-1

  7      PXM45     Active        8        PXM45      Standby        1-1

  15     SRM-3T3   Empty Res     16       SRM-3T3    Empty Resvd    1-1

  31     SRM-3T3   Empty Res     32       SRM-3T3    Empty Resvd    1-1
```

The secondary state for the card in the secondary slot changes to *Standby* only when the secondary card is ready to take over as active card. After you enter the **addred** command, the switch resets the secondary card. When you first view the redundancy status, the state may be *Empty Resvd* or *Init*. The secondary card may require one or two minutes to transition to standby.

Note The **dspcds** command also shows the redundancy relationship between two cards.

For information on managing redundant cards, see the “Managing Redundant Cards” section in Chapter 7, “Switch Operating Procedures.”

Selecting and Viewing Service Class Templates

A Service Class Template (SCT) is a configuration file that defines the traffic characteristics of the various class of service queues in a service module. When applied to a port, SCTs also serve in defining the policing characteristics on that port. There are two types of SCTs: the port SCT and the card SCT. Port SCTs are associated with logical ports on the switch. They define the flow of traffic on a port based on service categories. Card SCTs serve the same purpose as the port SCTs, except that they control the destination slot based cell queues towards the backplane.

Without SCTs, you need to perform a lot of detailed manual configuration on each and every port on the switch. This is time consuming and error prone. Typically, traffic profiles are defined by a handful of traffic engineering experts who understand the service level agreements and expected traffic pattern on the ports. These experts define the SCTs for each port in the system. Once the SCT is applied on the port,

you do not need to (re)configure the switch. The parameters in the SCTs define generic thresholds and priorities of queues that can be understood without having to go through the programming details of Queuing engines, such as QE48 (in AXSMs) or QE1210 (in AXSME).

SCT files include the following types of configuration data:

- general link parameters
- COSB parameters
- virtual circuit threshold parameters
- COSB threshold parameters

SCT files are applicable to AXSM, AXSME, FRSM12, and PXM1E cards. Each card-type has its own unique port SCT and card SCT. Card SCTs define traffic parameters between a specified card and other like cards in the switch. Port SCTs define traffic parameters on a single line or port. You can apply the same SCT to multiple cards or ports.

Port SCTs are classified as policing or non-policing. Typically, policing SCTs are used on UNI ports at the edge of the ATM network and control traffic entering the network. Non-policing SCTs are typically on trunk ports that interconnect switches within the network. Cisco provides default port SCT files with and without policing capability.

Note The policing parameters in a card SCT are ignored.

Note If traffic is properly controlled at the edges of an ATM network, there should be no need for policing within the network.

Each SCT is uniquely identified by its name, which is in the following format:
<*service_module_name*>_<PORT|CARD>.<*SCT_ID*>.V<*major_version*>

For example, an AXSME SCT file name might look as follows: AXSME_SCT.CARD.5.V1

Table 3-1 describes the parameters used in the SCT naming convention.

Table 3-1 SCT Naming Conventions

Parameter	Description
service_module_name	The name of the service module on which the SCT will be applied. The possible service modules are AXSM, AXSME, PXM1E, and FRSM12.
PORT|CARD	Specifies whether this is a port SCT or a card SCT.
SCT_ID	A 16-bit number uniquely identifying the SCT.
V<*major_version*>	A 16-bit number which identifies the major version of the SCT. The major version of the SCT changes whenever a new object is added or deprecated in the SCT MIB.

To enable ATM communications, you must assign a card SCT to every AXSM, PXM1E, and/or FRSM card in your network, and you must assign a port SCT to every port you use. The SCT files are stored in the F:\SCT\<*card type*> directory. For example, AXSM SCTs will be stored in the F:\SCT\AXSM directory.

Note Users do not have write access to the F:SCT /<*card_type*> directory. The only way to download SCT files to the F: directory is to download them to your C:/SCT/Temp directory first. For instructions on downloading and installing SCT files to your switch, see the "Installing SCT Files" section in Appendix A, "Downloading and Installing Software Upgrades."

Before you can assign an SCT to a card or port, you must first download the latest SCT files onto your switch. To find the location of the latest SCT files and verify that you need to update them, see the Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E). SCT files can be manually downloaded onto each node in your network through the CLI, or you can also use Cisco WAN Manager (CWM). The preferable way of downloading a SCT is by using CWM. To create additional SCT files or change the configuration of existing SCT files, you need to use (CWM).

You can not create or modify SCT files using the CLI.

Note Port SCTs can be changed with connections provisioned on the port. However, the port needs to be administratively downed to effect this change. Hence this is service affecting.

After you create a SCT file with CWM, you must use FTP to transfer that file to the switch before you can use it. For guidelines on transferring files to the switch, see the "Copying Software Files to the Switch" section in Appendix A, "Downloading and Installing Software Upgrades." Be sure to copy SCT filestotheC:\SCT\AXSM directoryontheeswitch.

The following sections describe how to select SCTs for cards and ports.

Selecting a Card SCT

A card SCT defines the queue parameters for the destination slot based cell queues towards the backplane. The same card SCT may be used for multiple cards of the same card type.

Note An SCT must reside in your switch F:/SCT directory before you can select it for a card or port. For instructions on manually downloading and installing SCTs to your switch, see "Installing SCT Files" in Appendix A, "Downloading and Installing Software Upgrades."

To select an SCT for a card, use the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 Enter the **cc** command to change to an active AXSM card for which you will select an SCT.

```
M8850_LA.8.PXM.a > cc 1

(session redirected)

M8850_LA.2.AXSM.a >
```

Note In a redundant pair, you must specify the SCT on the active card.

Step 3 All ports on the card must be down before you can configure the card SCT. To verify the status of the ports on the card, enter the **dspports** command.

```
M8850_LA.2.AXSM.a > dspports
ifNum Line Admin Oper. Guaranteed Maximum   SCT Id ifType  VPI   minVPI maxVPI
           State State Rate       Rate     (D:dflt        (VNNI, (EVNNI,EVUNI)
                                            used)          VUNI)
----- ---- ----- ----- ---------- --------- ------ ------ ------ ------ ------
    1  2.1    Up  Down    1412830   1412830   5       NNI      0      0      0
    2  2.2    Up  Down    1412830   1412830   5       NNI      0      0      0
    3  1.1    Up    Up    1412830   1412830   5       NNI      0      0      0
```

Enter the **dnport** command to bring down any ports that are in the Admin State “Up”.

```
M8850_LA.2.AXSM.a > dnport 2
dnport/dnallports can disrupt traffic on existing connections.
Use this command only to modify partition parameters or change SCT
Do you want to proceed (Yes/No) ? y
```

Step 4 Enter the **cnfcdsct** command.

```
pop20two.1.AXSM.a > cnfcdsct <sctID>
```

Replace *sctID* with the number of the SCT that you want to assign to the card. Table 3-2 describes the SCTID options.

Table 3-2 sctID Options

SCT ID	Description
1	Non-policing applications on PNNI-only networks.
2	Policing applications for PNNI-only networks.
3	Non-policing for combined MPLS/PNNI networks.
4	Non-policing applications for combined MPLS/PNNI networks.

Note When an AXSM card is powered up for the first time, the default card SCT file is used. You must run this command in order to use another SCT file. The default SCT file s 0.

Step 5 To display the SCT assigned to a card, enter the following command:

```
pop20two.1.AXSM.a > dspcd
```

The display card report displays a row labeled “Card SCT Id,” which identifies the SCT assigned to the card.

```
M8850_LA.1.AXSM.a > dspcd
                    Front Card          Upper Card          Lower Card
                    ----------          ----------        ------------

Card Type:          AXSM-4-622          SMFIR-2-622         SMFIR-2-622
State:              Active              Present             Present
Serial Number:      SAK0350007N         SAK0346003F         SBK043902FE
Boot FW Rev:        3.0(0.171)P2        ---                 ---
SW Rev:             3.0(0.171)P2        ---                 ---
800-level Rev:      09                  13                  A1
Orderable Part#:    800-5774-5          800-5383-1          800-5383-1
PCA Part#:          73-4504-2           73-4125-1           73-4125-1
CLEI Code:          BAA1BADAAA          0000000000          BAI9ADTAAA
```

```
Reset Reason:       Power ON Reset

Card Operating Mode: AXSM-A

SCT File Configured Version: 1

SCT File Operational Version: 1

Card SCT Id: 5


Type <CR> to continue, Q<CR> to stop:
```

Step 6 Enter the **upport** <*if*> command to bring up any ports you brought down in Step 3. Replace <*if*> with the interface number of the downed port.

```
M8850_LA.1.AXSM.a > upport 1
```

Step 7 Enter the **dspports** command to verify that all ports on the card are up.

```
M8850_LA.1.AXSM.a > dspports
ifNum Line Admin Oper. Guaranteed Maximum   SCT Id ifType  VPI   minVPI maxVPI
           State State Rate       Rate     (D:dflt        (VNNI, (EVNNI,EVUNI)
                                            used)          VUNI)
----- ---- ----- ----- ---------- --------- ------ ------ ------ ------ ------
    1  2.1    Up    Up    1412830   1412830   5       NNI      0      0      0
    2  2.2    Up    Up    1412830   1412830   5       NNI      0      0      0
    3  1.1    Up    Up    1412830   1412830   5       NNI      0      0      0
```

Selecting a Port SCT

A port SCT defines queue parameters that apply to egress queues on a port. You can use the same port SCT for multiple ports. To select an SCT for a port, enter the **addport** command as described in the "Adding ATM Ports" section in Chapter 6, "Provisioning AXSM Communication Links."

Note An SCT must reside in your switch F:/SCT directory before you can select it for a card or port. For instructions on manually downloading and installing SCTs to your switch, see "Installing SCT Files" in Appendix A, "Downloading and Installing Software Upgrades."

Setting Up Lines

The first step in configuring AXSM lines is to define the physical lines that are connected to the switch. The following sections describe how to do the following tasks:

- Bring up lines
- Configure lines
- Verify the configuration of lines

Bringing Up Lines

Installing an AXSM card can add from 1 to 16 lines to your switch. You must bring up a line before you can configure the line or provision services on the line.

Before a line is brought up, or after it is brought down, the switch does not monitor the line. The AXSM port status light for the line is unlit, and all line alarms are cleared.

When you bring up a line, the switch starts monitoring the line. The AXSM port status light is green when physical layer communications are established with a remote switch. If physical layer communications problems are detected, the port status light turns red, and alarms are reported.

Note APS protection lines for intracard redundancy should be left down. APS automatically brings up each line at the appropriate time. For general information on APS line redundancy, see the "Planning for Card and Line Redundancy" section in Chapter 1, "Preparing for Configuration." For information on configuring APS lines, see the "Establishing Redundancy Between Two Lines with APS" section later in this chapter.

Tip To minimize the number of alarms and failed port status lamps (which display red), keep lines down until they are ready for operation.

To bring up a line on the switch, use the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 Select the card on which you want to bring up a line with the **cc** command.

```
mgx8850a.7.PXM.a > cc <slotnumber>
```

Replace <*slotnumber*> with the number of the slot in which the AXSM card is installed. Valid slot numbers are from 1 to 6 and 9 to 14. Verify your card selection by viewing the switch prompt, which should list the slot number and the AXSM card type.

Step 3 Enter the **upln** command after the switch prompt.

```
mgx8850a.10.AXSM.a > upln <bay.line>
```

Replace <*bay*> with 1 if the line is connected to a back card in the upper bay, or replace it with 2 if the line is connected to a back card in the lower bay. Replace <*line*> with the number that corresponds to the back card port to which the line is connected. Table 3-3 lists the valid bay numbers and line numbers for each AXSM card. Figure 3-1 illustrates the bay and line numbers used on the Cisco MGX 8850 and Cisco MGX 8950 switches.

Table 3-3 AXSM Card Types

Front Card	Valid Line Numbers	Valid Bay Numbers
AXSM-16-T1E1-E	1 to 16	1, 2
AXSM-16-T3E3 AXSM-16-T3E3/B	1 to 8	1, 2
AXSM-16-T3E3-E	1 to 8	1, 2
AXSM-8-155-E	1 to 4	1, 2

Table 3-3 AXSM Card Types (continued)

Front Card	Valid Line Numbers	Valid Bay Numbers
AXSM-16-155 AXSM-16-155/B	1 to 8	1, 2
AXSM-2-622-E	1 to 1	1, 2
AXSM-4-622 AXSM-4-622/B	1 to 4	1, 2
AXSM-1-2488 AXSM-1-2488/B	1	1
AXSM-32-E	1 to 32	1, 2

Step 4 Enter the following command:

```
8850_NY.7.PXM.a > dsplns
```

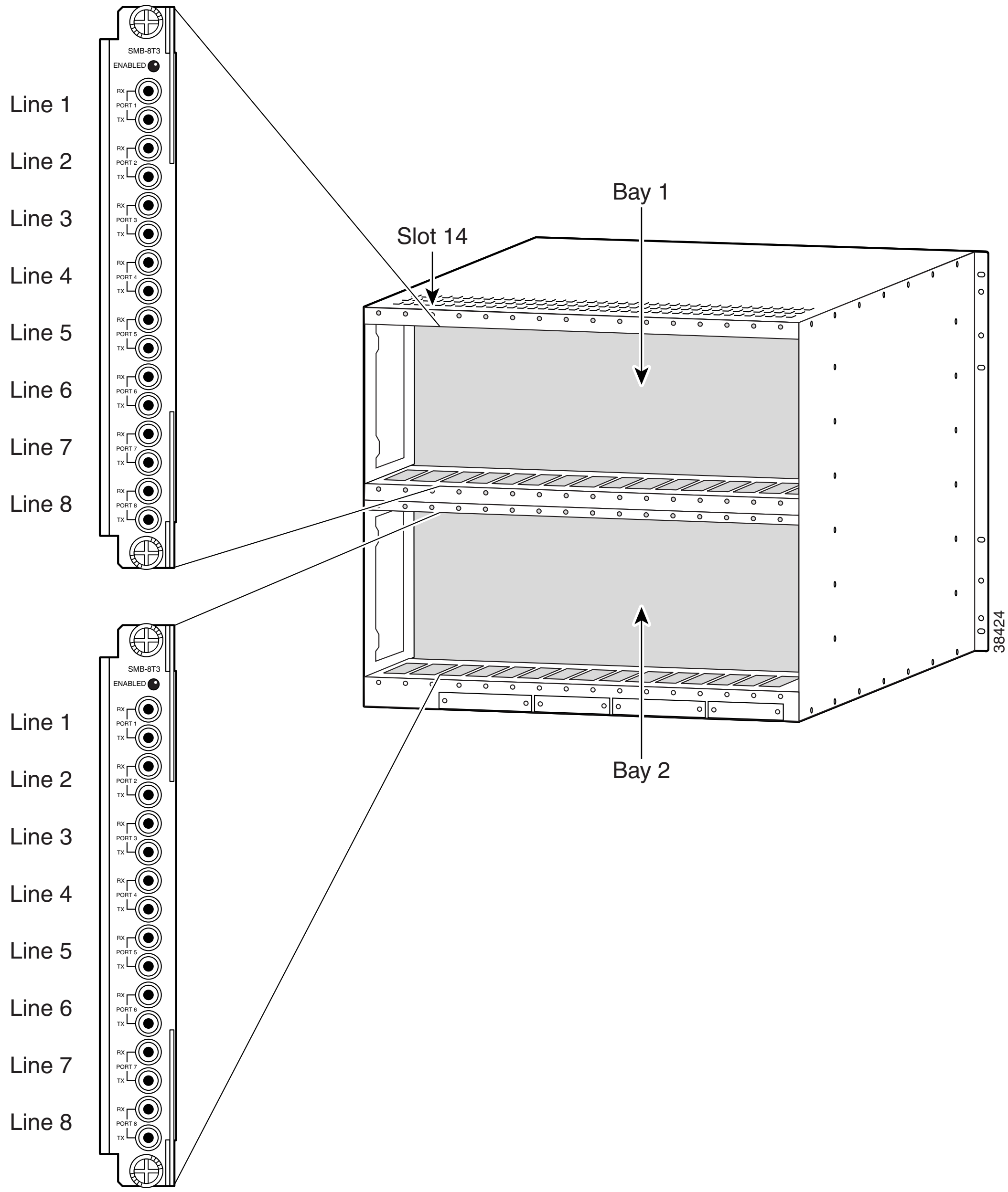
The line state column shows whether each line is up or down as shown in the following example:

```
8850_NY.7.PXM.a > dsplns
                                           Medium Medium
  Sonet  Line     Line     Line    Frame   Line   Line      Alarm   APS
  Line  State     Type     Lpbk   Scramble Coding Type      State   Enabled
  ----- ----- ------------ ------ -------- ------ -------   -----   --------
   1.1     Up sonetSts12c NoLoop   Enable  Other ShortSMF    Clear Disable
   1.2     Up sonetSts12c NoLoop   Enable  Other ShortSMF    Clear Disable
   2.1     Up sonetSts12c NoLoop   Enable  Other ShortSMF    Clear Disable
   2.2     Up sonetSts12c NoLoop   Enable  Other ShortSMF    Clear Disable
```

The line state, which is either Up or Down, represents the administrative intent for the line. For example, a line is reported as Down until an administrator brings up the line. Once the administrator brings up the line, the line state remains Up until the administrator brings the line down with the **dnln** command).

The alarm state indicates whether the line is communicating with a remote switch. When the alarm state is reported as Clear, the physical devices at each end of the line have established physical layer communications. ATM connectivity is established later when interfaces or ports are configured on the line.

Figure 3-1 Bay and Line Numbers



Configuring SONET Lines

All line types are brought up with a default configuration. When configuring trunks between two MGX 8850 or MGX 8950 switches, you may be able to accept the defaults for each switch and thus minimize configuration time. When configuring a line to another type of device, ensure that both devices are using the same configuration parameters on the shared line.

At the physical communications level, you can configure the following options for SONET lines:

- Line type
- Line clock source

The following procedure describes how to configure SONET lines.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 If you do not know the line number you want to configure, enter the **dsplns** command to display a list of the lines.

```
8850_NY.1.AXSM.a > dsplns
```

Remember that you cannot configure a line until you have brought it up as described in the previous section, "Bringing Up Lines."

Step 3 To display the configuration for a line, enter the **dspln** command. For example:

```
8850_NY.1.AXSM.a > dspln -sonet 1.2
  Line Number             : 1.2
  Admin Status            : Up                 Alarm Status        : Critical
  Loopback                : NoLoop             APS enabled         : Disable
  Frame Scrambling        : Enable             Number of ports     : 1
  Xmt Clock source        : localTiming        Number of partitions: 1
  Line Type               : sonetSts12c        Number of SPVC      : 1
  Medium Type(SONET/SDH)  : SONET              Number of SPVP      : 0
  Medium Time Elapsed     : 528464             Number of SVC       : 0
  Medium Valid Intervals  : 96
  Medium Line Type        : ShortSMF
```

For more information, see the "Verifying Line Configuration" section later in this chapter.

Step 4 To configure a SONET line, enter the following commands:

```
8850_NY.1.AXSM.a > cnfln -sonet <bay.line> -slt <LineType> -clk <clockSource>
```

Table 3-4 lists the parameter descriptions for configuring SONET, DS3 and E3 lines. Be sure to use only the parameters listed for SONET lines.

Table 3-4 Parameters for cnfln Command

Parameter	Line Types Supported	Description
AIScBitsCheck	T3	The **-cb** option defines C-bit checking. Set <*AIScBitsCheck*> to **1** to enable C-bit checking. Set it to **2** to ignore the C-bit.
bay.line	T3 E3 SONET	Replace *bay* with **1** if the line is connected to a back card in the upper bay, or replace it with **2** if the line is connected to a back card in the lower bay. Replace *line* with the number that corresponds to the back card port to which the line is connected. Table 3-3 lists the valid line numbers for each AXSM card.
clockSource	T3 E3 SONET	The **-clk** option selects the source timing for transmitting messages over the line. Replace <*clockSource*> with **1** to use the clock signal received over this line from a remote node, or specify **2** to use the local timing defined for the local switch. For information on defining the clock source for the local switch, see the "Managing Network Clock Sources" section in Chapter 7, "Switch Operating Procedures."
LineLength	T3 E3	The **-len** option specifies the length of a T3 line from the local node to a remote node in meters. Enter a value from 0 to 64000 meters.
LineType	SONET	Enter **-slt 1** for SONET or **-slt 2** for SDH.
LineType	T3	Enter **-lt 1** for ds3cbitadm or **-lt 2** for ds3cbitplcp.
OOFCriteria	T3	Out-of-Frame (OoF) alarm criteria. Replace <*OOFCriteria*> with **1** to select 3 out of 8 and **2** to select 3 out of 16.
RcvFEACValidation	T3	Replace <*RcvFEACValidation*> with **1** to select 4 out of 5 and **2** to select 8 out of 10.

Step 5 To verify your configuration changes, enter the **dspln** command.

Configuring T3 Lines

All line types are brought up with a default configuration. When configuring trunks between two MGX 8850 or MGX 8950 switches, you may be able to accept the defaults for each switch and thus minimize configuration time. When configuring a line to another type of device, ensure that both devices are using the same configuration parameters on the shared line.

At the physical communications level, you can configure the following options for DS3 lines:

- Line type
- Line length (distance in meters)
- C-bit checking
- Line clock source
- Out of Frame alarm criteria
- RcvFEACValidation

The following procedure describes how to configure T3 lines.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 If you do not know the line number you want to configure, enter the **dsplns** command to display a list of the lines.

```
8850_LA.3.AXSM.a > dsplns
```

Remember that you cannot configure a line until you have brought it up as described in the previous section, "Bringing Up Lines."

Step 3 To display the configuration for a line, enter the **dspln** command. For example:

```
8850_LA.3.AXSM.a > dspln -ds3 1.1
  Line Number         : 1.1
  Admin Status        : Up                Alarm Status         : Clear
  Line Type           : ds3cbitadm        Number of ports      : 1
  Line Coding         : ds3B3ZS           Number of partitions: 0
  Line Length(meters) : 0                 Number of SPVC       : 0
  OOFCriteria         : 3Of8Bits          Number of SPVP       : 0
  AIS c-Bits Check    : Check             Number of SVC        : 0
  Loopback            : NoLoop
  Xmt. Clock source   : localTiming
  Rcv FEAC Validation : 4 out of 5 FEAC codes
```

For more information, see "Verifying Line Configuration," which appears later in this chapter.

Step 4 To configure a T3 line, enter the **cnfln** command, as shown in the following example.

```
8850_LA.3.AXSM.a > cnfln -ds3 <bay.line> -len <LineLength> -clk <clockSource>
-lt <LineType> -oof <OOFCriteria> -cb <AIScBitsCheck> -rfeac <RcvFEACValidation>
```

Table 3-4 lists the parameter descriptions for configuring SONET, T3 and E3 lines. Be sure to use only the parameters listed for T3 lines.

Step 5 To verify your configuration changes, enter the **dspln** command.

Configuring E3 Lines

All line types are brought up with a default configuration. When configuring trunks between two MGX 8850 or MGX 8950 switches, you may be able to accept the defaults for each switch and thus minimize configuration time. When configuring a line to another type of device, ensure that both devices are using the same configuration parameters on the shared line.

At the physical communications level, you can configure the following options for E3 lines:

- Line length (distance in meters)
- Line clock source

The following procedure describes how to configure E3 lines.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 If you do not know the line number you want to configure, enter the **dsplns** command to display a list of the lines:

Step 3 To verify your configuration changes, enter the **dspln** command.

```
8850_LA.4.AXSM.a > dspln
```

Remember that you cannot configure a line until you have brought it up as described in the previous section, "Bringing Up Lines."

Step 4 To configure an E3 line, enter the following command:

```
8850_LA.4.AXSM.a > cnfln -ds3 <bay.line> -len <LineLength> -clk <clockSource>
```

Table 3-4 lists the parameter descriptions for configuring SONET, DS3 and E3 lines. Be sure to use only the parameters listed for E3 lines.

Step 5 To verify your configuration changes, enter the **dspln** command.

Verifying Line Configuration

To display the configuration of a line, use the following procedure.

Step 1 Establish a CLI management session at any user access level.

Step 2 If you do not know the line number you want to view, display a list of the lines by entering the following command:

```
mgx8850a.10.AXSM.a > dsplns
```

Step 3 To display the configuration of a single line, enter the following command:

```
mgx8850a.10.AXSM.a > dspln -type <bay.line>
```

Table 3-5 describes the command parameters. The line configuration appears as follows:

```
pop2one.10.AXSM.a > dspln -sonet 2.1
  Line Number           : 2.1
  Admin Status          : Up                 Alarm Status        : Clear
  Loopback              : NoLoop             APS enabled         : Disable
  Frame Scrambling      : Enable             Number of ports     : 1
  Xmt Clock source      : localTiming        Number of partitions: 1
```

```
Line Type              : sonetSts12c       Number of SPVC      : 0
Medium Type(SONET/SDH) : SONET             Number of SVC       : 4
Medium Time Elapsed    : 248198
Medium Valid Intervals : 96
Medium Line Type       : ShortSMF
```

Table 3-5 dspln Command Parameters

Parameter	Description
type	The parameter specifies the type of line that is connected to the switch. Replace <*type*> with **-sonet** or **-ds3**. The **-ds3** option works for DS3 and E3 lines.
bay	Replace <*bay*> with **1** if the line is connected to a back card in the upper bay, or replace it with **2** if the line is connected to a back card in the lower bay.
line	Replace <*line*> with the number that corresponds to the back card port to which the line is connected. Table 3-3 lists the valid line numbers for each AXSM card.

Establishing Redundancy Between Two Lines with APS

The switch supports two types of line redundancy:

- Intracard redundancy, where the working and protection lines are connected to the same card
- Intercard redundancy, where the working line is connected to the primary card, and the protection line is connected to the secondary card

The following sections describe how to add redundancy for these types of APS lines.

Adding Intracard APS Lines

To establish redundancy between two lines on the same card, use the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1_GP privileges or higher.

Step 2 If you have not done so already, bring up the working line as described in the "Bringing Up Lines" section, which appears earlier in this chapter.

Step 3 Enter the **addapsln** command as follows:

```
pop20two.1.AXSM.a > addapsln <workingIndex> <protectIndex> <archmode>
```

Replace <*workingIndex*> with the location of the working line using the format "slot.bay.line." For example, to specify the line on card 2, bay 1, line 2, enter 2.1.2.

Replace <*protectIndex*> with the location of the protection line, using the same format used for the working line.

Note For intracard redundancy, the working index and protection index must specify ports on the same card, so the slot number will always match.

Replace <*archmode*> with the option number that selects the automatic protection switching (APS) architecture mode you want to use. Table 3-6 shows the option numbers and the architecture modes they select.

Table 3-6 APS Line Architecture Modes

Option	Description
1	Selects 1+1 signaling (transmission on both working and protect lines) for intracard APS.
2	Selects 1:1 signaling (transmission on either the working line or the protect line) for intracard APS. **Note** Intracard APS 1:1 is not supported on AXSM-8-155/B, AXSM-4-622/B, and AXSM-1-2488/B cards.
3	Selects G.783, Annex B 1+1 signaling. This option is not supported in this release.
4	Selects y cable 1+1 signaling without k1 and k2.
5	Selects y cable 1+1 signaling without k1 and k2.

In the following example, 1+1 APS redundancy is assigned to two lines on the same card:

```
pop20one.9.AXSM.a > addapsln 9.2.1 9.2.2 1
```

Step 4 To display a list of all the APS lines on an AXSM card, enter the **dspapslns** command on the active AXSM card.

Step 5 To display information on a specific APS line, enter the **dspapsln** <*slot.bay.line*> command on the active AXSM card.

For information on managing redundant APS lines, see the "Managing Redundant APS Lines" section in Chapter 7, "Switch Operating Procedures."

Adding Intercard APS Lines

To establish redundancy between two lines on different cards, use the following procedure.

Note For intercard APS to operate properly, an APS connector must be installed between the two cards. For more information in the APS connector and how to install it, refer to either the *Cisco MGX 8850 Hardware Installation Guide (PXM45/B and PXM1E)* or the *Cisco MGX 8950 Hardware Installation Guide.*

Note APS is not supported on AXSM-1-2488/B cards. For the AXSM-16-155/B and AXSM-4-622/B front cards, you must use /B version back cards. You can use an AXSM front card and back card in one slot and configure redundancy with an AXSM/B front card and AXSM/B back card in another slot. The switch supports APS when the front and back cards are the same revision.

Step 1 Establish a configuration session using a user name with GROUP1_GP privileges or higher.

Step 2 If you have not done so already, add card redundancy as described in the “Establishing Redundancy Between Two AXSM Cards” section.

Step 3 If you have not done so already, bring up the working and protection lines as described in “Bringing Up Lines.”

Step 4 Verify that an APS connector is installed between the cards that host the working and protection lines by entering the **dspapsbkplane** command.

Step 5 Enter the **addapsln** command as follows:

```
pop20one.7.PXM.a > addapsln <workingIndex> <protectIndex> <archmode>
```

Replace <*workingIndex*> with the location of the working line using the format slot.bay.line. For example, to specify the line on card 2, bay 1, line 2, enter 2.1.2.

Replace <*protectIndex*> with the location of the protection line, using the same format used for the working line.

Note For intercard redundancy, the working index and protection index must specify ports on different cards. Also, the working line index must identify a line on the primary card.

Replace <*archmode*> with an option number that defines the type of line redundancy you want to use. Table 3-6 shows the option numbers and the types of redundancy they select.

In the following example, 1+1 APS redundancy is assigned to lines on two different cards:

```
pop20one.1.AXSM.a > addapsln 1.1.2 2.1.2 1
```

Step 6 Enter the **dspapsbkplane** command on both the standby and active cards to verify that the APS connector is installed properly.

Note This command can show different values for each of the two cards, which indicates the APS connector is seated properly on one card, but not on the other.

Step 7 To display the a list of all the APS lines on an AXSM card, enter the **dspapslns** command.

For information on managing redundant APS lines, see the "Managing Redundant APS Lines" section in Chapter 7, "Switch Operating Procedures."

CHAPTER 4

Preparing FRSM12 Cards and Lines for Communication

This chapter describes how to prepare FRSM12 cards for standalone or redundant operation in Cisco MGX Release 3 switches. *Frame Relay Services for MGX Release 3.0 Switches* describes how to provision these cards for Frame Relay communications across an ATM network.

This chapter provides a quickstart procedure for configuring FRSM12 cards and lines and describes the following procedures:

- Managing Firmware Version Levels for FRSM12 Cards
- Establishing Redundancy Between Two FRSM12 Cards
- Selecting and Viewing Service Class Templates

Configuration Quickstart

The quickstart procedure in this section provides a summary of the tasks required to prepare FRSM12 cards and lines to enable Frame Relay communications over an ATM network. This procedure is provided as an overview and as a quick reference for those who already have configured FRSM12 cards.

	Command	Purpose
Step 1	*username* <*password*>	Start a configuration session. **Note** To perform all the procedures in this quickstart procedure, you must log in as a user with GROUP1 privileges or higher.
Step 2	**setrev** <*slot*> <*version*> Related commands: **dspcds**	Initialize FRSM12 cards by setting the firmware version level for each FRSM12 card. See "Managing Firmware Version Levels for FRSM12 Cards," which appears later in this chapter.

	Command	Purpose
Step 3	**addred** <*options*> Related commands: **dspred**	Define which FRSM12 cards are operating as redundant cards. See "Establishing Redundancy Between Two FRSM12 Cards," which appears later in this chapter.
Step 4	**cnfcdsct** <*sctid*> Related commands: **dspcd**	Applies communications parameters from a preconfigured Service Class Template (SCT) file to all communications between the card you are configuring and the other FRSM12 cards in the switch. For PNNI communications, use SCT ID 2 or 4 for policing applications and use SCT ID 3 or 5 for non-policing applications. If MPLS will be used on any card link, use SCT ID 4 for policing applications and use SCT ID 5 for non-policing applications. See "Selecting and Viewing Service Class Templates," which appears later in this chapter.

Managing Firmware Version Levels for FRSM12 Cards

The FRSM12 cards within the switch run two types of firmware: boot firmware and runtime firmware. The boot firmware provides the startup information the card needs. The boot firmware is installed on the board at the factory. The runtime firmware controls the operation of the card after startup. The runtime firmware file is stored on the PXM45 hard disk.

After the FRSM12 cards are installed in the switch, you must specify the correct runtime firmware version for each card before the switch can begin using the card. The following sections explain how to

- Locate the cards that need to have the firmware version level set
- Set the firmware version levels for cards in the switch
- Verify the firmware version levels being used by cards

Locating Cards that Need the Firmware Version Set

When an FRSM12 card is installed and the firmware version needs to be set, the System Status LED on the front of the card blinks red. The **dspcds** command shows that the card status is Failed. Other events can display these symptoms, but if the FRSM12 card is new, the problem is probably that the firmware version number has not been set. To locate the cards that need to have the firmware version set, use the following procedure.

Step 1 Establish a CLI management session at any access level.

Step 2 To display a list of all the cards in the switch, enter the **dspcds** command:

```
8850_NY.7.PXM.a > dspcds
```

The following example shows the display for this command. The card state for the card in slot 4 is listed as Failed/Active. This is how a card appears when the runtime firmware version has not been selected.

```
hsfrnd6.8.PXM.a > dspcds
hsfrnd6                          System Rev: 03.00   Feb. 15, 2002 06:10:03 GMT
Chassis Serial No:   SCA044304MV Chassis Rev: E0     GMT Offset: 0
                                                     Node Alarm: MAJOR
Card  Front/Back          Card           Alarm      Redundant   Redundancy
Slot  Card State          Type           Status     Slot        Type
---   ----------          --------       --------   -------     -----

01    Empty               ---            ---        ---         ---
02    Empty               ---            ---        ---         ---
03    Empty               ---            ---        ---         ---
04    Failed/Active       FRSM12_12T3E3  MAJOR      NA          NO REDUNDANCY
05    Empty               ---            ---        ---         ---
06    Empty               ---            ---        ---         ---
07    Empty Resvd/Empty   ---            NONE       08          PRIMARY SLOT
08    Active/Active       PXM45          NONE       07          SECONDARY SLOT
09    Empty               ---            ---        ---         ---
10    Empty               ---            ---        ---         ---
11    Active/Active       FRSM12_12T3E3  NONE       NA          NO REDUNDANCY
12    Empty               ---            ---        ---         ---
13    Empty Resvd/Empty   ---            MAJOR      NA          NO REDUNDANCY
14    Empty               ---            ---        ---         ---
17    Empty               ---            ---        ---         ---

Type <CR> to continue, Q<CR> to stop:
```

Note the slot number, card type, and redundancy type for each card that needs to have the firmware version set. You will need this information to activate these cards as described in the next section, "Initializing FRSM12 Cards."

Note If any FRSM12 card displays the Active/Active card state, you do not have to set the runtime firmware version for that card.

Initializing FRSM12 Cards

Before a FRSM12 card can operate, it must be initialized in a switch slot. The initialization process defines the FRSM12 runtime software version that will run on the card and identifies the slot in which the card operates. To initialize an FRSM12 card, use the following procedure.

Note The PXM45 card supports a maximum of 99 lines on the switch. As you add FRSM12 cards, verify that the line count for all AXSM and FRSM12 cards does not exceed this number.

Step 1 If you have not already done so, determine the software version number for the card by referring to the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)*.

Tip If you have trouble locating the runtime firmware version level, use the filenames on the PXM45 hard disk to determine the level. For more information, see "Determining the Software Version Number from Filenames," in Chapter 7, "Switch Operating Procedures."

Step 2 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 3 To set the firmware revision level for a card, enter the **setrev** command:

```
mgx8850a.7.PXM.a > setrev <slot> <version>
```

Note Each card should be initialized only once with the **setrev** command. The only other time you should enter the **setrev** command is to initialize cards after the configuration has been cleared with the **clrallcnf**, **clrcnf**, or **clrsmcnf** commands.

Replace <*slot*> with the card slot number and replace <*version*> with the software version number. For example,

```
mgx8850a.7.PXM.a > setrev 4 3.0(0)
```

After you enter the **setrev** command, the system status LED blinks red until the firmware load is complete, and then it changes to non-blinking green.

Step 4 To verify the activation of a card for which the status was previously listed as Failed/Empty, enter the **dspcds** command. The status should change to Active/Active.

Verifying Card Firmware Version Levels

When you are having problems with your switch, or when you have taken delivery of a new switch but delayed installation, it is wise to verify the firmware versions installed on the switch. If newer versions of this firmware are available, installing the updated firmware can prevent switch problems.

To verify the firmware versions in use on your switch, use the following procedure.

Step 1 To display the software revision status of all the cards in a switch, enter the **dsprevs** command as follows:

```
hsfrnd6.8.PXM.a > dsprevs
hsfrnd6                           System Rev: 03.00   Feb. 15, 2002 06:19:35 GMT
MGX8850                                               Node Alarm: NONE
Physical  Logical   Inserted       Cur Sw              Boot FW
Slot      Slot      Card           Revision            Revision
--------  -------   --------       --------            --------

01        01        ---            ---                 ---
02        02        ---            ---                 ---
03        03        ---            ---                 ---
04        04        FRSM12_12T3E3  3.0(0)              3.0(0)
05        05        ---            ---                 ---
06        06        ---            ---                 ---
07        07        ---            ---                 ---
08        07        PXM45          3.0(0)              3.0(0)
09        09        ---            ---                 ---
10        10        ---            ---                 ---
11        11        FRSM12_12T3E3  3.0(0)              3.0(0)
12        12        ---            ---                 ---
13        13        ---            ---                 ---
14        14        ---            ---                 ---
15        15        ---            ---                 ---
16        15        ---            ---                 ---

Type <CR> to continue, Q<CR> to stop:
```

Step 2 To see the software revision levels for a single card, enter the **dspversion** command as follows:

```
hsfrnd6.4.FRSM12.a > dspversion

  Image Type   Shelf Type    Card Type         Version   Built On
  ----------   ----------   ----------    ------------   ------------
     Runtime          MGX       FRSM12     3.0(0)        Feb 14 2002, 19:46:30
        Boot          MGX       FRSM12     3.0(0)        -
```

Step 3 Another way to see the software revision levels for a single card is to enter the **dspcd** command as follows:

```
hsfrnd6.4.FRSM12.a > dspcd
                    Front Card          Upper Card          Lower Card
                    ----------          ----------        ------------

Card Type:          FRSM12_12T3E3       SMB-6-T3            SMB-6-T3

State:              Active              Present             Present

Serial Number:      12345678901         12                  10101010101

Boot FW Rev:        3.0.(0)             ---                 ---

SW Rev:             3.0.(0)             ---                 ---

HW Rev:             0.0                 0.0                 0.0

Orderable Part#:    800-12345-03        800-12345-01        800-00100-23

PCA Part#:          73-5530-02          73-1234-01          73-1111-22

CLEI Code:          000000123           12                  1234567890
```

```
Reset Reason:Power ON Reset

Type <CR> to continue, Q<CR> to stop:

Card Alarm:

Card Summary:

Card SCT Id: 0 !DefaultSCT used!

#Lines #Ports #Partitions
------ ------ -----------
    11     10          10
 #SPVC   #MaxConns
------ ---------
     1      16000
```

Step 4 Using the **dsprevs** and **dspcd** commands, complete the hardware and software configuration worksheet in Table 2-8.

Step 5 Compare the versions you noted in Table 2-8 with the latest versions listed in the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)*.

Step 6 If the switch requires software updates, upgrade the software using the instructions in Appendix A, "Downloading and Installing Software Upgrades."

Establishing Redundancy Between Two FRSM12 Cards

To establish redundancy between two FRSM12 cards, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 If you have not done so already, set the firmware version for both cards, as described earlier in "Initializing FRSM12 Cards."

Step 3 Enter the **dspcds** command to verify that both FRSM12 cards are in the "Active" state.

Step 4 Enter the **addred** command as follows:

```
pop20one.7.PXM.a > addred <redPrimarySlotNum> <redSecondarySlotNum> <redType>
```

Replace <*redPrimarySlotNum*> with the slot number of the FRSM12 card that will be the primary card, and replace <*redSecondarySlotNum*> with the slot number of the secondary FRSM12 card. Replace <*redType*> with the number 1, which selects 1:1 Y-cable redundancy. Although the online help lists other redundancy types, 1:1 Y-cable redundancy is the only type supported on FRSM12 cards in this release.

Note One of the two cards can be configured before redundancy is established. If this is the case, the configured card should be specified as the primary card. Redundancy cannot be established if the secondary card has active lines. If the secondary card has active lines, you must delete all ports and down all lines before it can be specified as a secondary card. You clear the configuration on a single service module with the **clrsmcnf** command.

Tip If the switch displays the message, `ERR: Secondary cd is already reserved`, then lines are already in use on the specified secondary card. Use the **dnln** command to bring down these lines before re-entering the **addred** command, or enter the **clrsmcnf** command for the secondary card.

Step 5 To verify that the redundancy relationship is established, enter the **dspred** command as shown in the following example:

```
pop20two.7.PXM.a > dspred
pop20two                         System Rev: 02.01   Feb. 06, 2001 11:24:53 PST
MGX8850                                              Node Alarm: NONE
Primary  Primary   Primary    Secondary  Secondary  Secondary    Redundancy
SlotNum   Type      State      SlotNum     Type       State         Type
-------  -------  ---------   ---------  ---------  ---------    ----------
   1      FRSM12    Active        2        FRSM12     Standby        1-1

   7      PXM45     Active        8        PXM45      Standby        1-1

   15     SRM-3T3   Empty Res     16       SRM-3T3    Empty Resvd    1-1

   31     SRM-3T3   Empty Res     32       SRM-3T3    Empty Resvd    1-1
```

The secondary state for the card in the secondary slot changes to *Standby* only when the secondary card is ready to take over as active card. After you enter the **addred** command, the switch resets the secondary card. When you first view the redundancy status, the state may be *Empty Resvd* or *Init*. The secondary card may require one or two minutes to transition to standby.

Note The **dspcds** command also shows the redundancy relationship between two cards.

For information on managing redundant cards, see the "Managing Redundant Cards" section in Chapter 7, "Switch Operating Procedures."

Selecting and Viewing Service Class Templates

The following sections describe how to select SCTs for cards and ports.

Selecting a Card SCT

A card SCT defines ATM parameters that apply to communications between the card you are configuring and the other service modules in the switch. You can use the same SCT for multiple FRSM12 cards. To select an SCT for a card, use the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 Enter the following command:

```
pop20two.1.FRSM12.a > cnfcdsct <sctID>
```

Note When an FRSM12 card is powered up for the first time, the default card SCT file is used. You must run this command in order to use another SCT file. The default SCT file is 0.

Replace *sctID* with the number of the SCT that you want to assign to the card. For PNNI communications, use SCT ID 2 or 4 for policing applications and use SCT ID 3 or 5 for non-policing applications. If MPLS will be used on any card link, use SCT ID 4 for policing applications and use SCT ID 5 for non-policing applications.

Note For most applications, Cisco Systems recommends using non-policing card SCTs.

Step 3 To display the SCT assigned to a card, enter the following command:

```
pop20two.1.FRSM12.a > dspcd
```

The display card report displays a row labeled “Card SCT Id,” which identifies the SCT assigned to the card.

Selecting a Port SCT

A port SCT defines ATM parameters that apply to communications through a single port. You can use the same port SCT for multiple ports. To select an SCT for a port, enter the **addport** command as described in *Frame Relay Services for MGX Release 3.0 Switches*.

CHAPTER 5

Preparing RPM-PR Cards for Operation

This chapter describes how to do the following tasks:

- Determine which slots host the RPM-PR cards
- Initialize RPM-PR cards that are installed in the switch
- Verify the software version used on the RPM-PR cards
- Configure backup cards for RPM-PR cards
- Where to find additional information on configuring RPM-PR cards

Note Some of the procedures in this chapter require you to enter Cisco IOS commands that runs on the RPM-PR cards. The procedures in this chapter do not describe how to use Cisco IOS commands, but they do include examples that list all the Cisco IOS commands needed to complete the procedure. For more information on any Cisco IOS command, refer to the Cisco IOS documentation.

Configuration Quickstart

The quickstart procedure in this section provides a summary of the tasks required to prepare RPM-PR cards for operation. This procedure is provided as an overview and as a quick reference for those who have already configured the Cisco MGX 8850 and Cisco MGX 8950 switches.

	Command	Purpose
Step 1	*username* <*password*>	Start a configuration session. **Note** To perform all the procedures in this quickstart procedure, you must log in as a user with SUPER_GP privileges or higher.
Step 2	**dspcds** **dspcd** **cc** <*slotnumber*>	Locate RPM-PR cards that need to be configured. See the “Locating RPM-PR Cards in the Switch” section, which appears later in this chapter.

	Command	Purpose
Step 3	**boot system** c:<*filename*> **boot config e:auto_config_***slot* **copy run start** **cc 7** **resetcd** *slot* Related commands: **dspcds**	Initialize RPM-PR cards by identifying a runtime software file and storing the configuration on the PXM45 hard disk. See the "Initializing RPM-PR Cards" section, which appears later in this chapter.
Step 4	**show version**	Verify the software version for each RPM-PR card. See the "Verifying the Software Version in Use" section, which appears later in this chapter.
Step 5	**addred** <*options*>	Define RPM-PR secondary cards that will operate as backup cards for RPM-PR primary cards. See the "Establishing Redundancy Between Two RPM-PR Cards" section, which appears later in this chapter.

Locating RPM-PR Cards in the Switch

You already have the location of the RPM-PR cards if you have completed the Hardware Configuration Worksheet (See Table 2-10) in the "Verifying the Hardware Configuration" section of Chapter 2, "Configuring General Switch Features." That section describes how to locate the RPM-PR cards, as well as other switch cards, and how to determine if the RPM-PR front and back cards are installed in the correct slots.

Understanding dspcds and dspcd Displays for RPM-PR

The **dspcds** and **dspcd** displays for RPM-PR cards are similar to those for other cards, but they contain the following differences:

- RPM-PR cards are identified as RPM_PR cards.
- If one or more RPM-PR back card are installed for an RPM-PR card, the status for the appropriate bay changes from Empty to Active. The switch does not detect and display the card type or software revision status.
- The Standby status for the front card indicates that the card is either operating in boot mode, or that the card is operating as a standby card for another RPM-PR card.

The following example shows the **dspcd** command display for an RPM-PR card:

```
8850_NY.7.PXM.a > dspcd 9
8850_NY                          System Rev: 02.01   Mar. 01, 2001 13:59:41 PST
MGX8850                                              Node Alarm: NONE
Slot Number:   9    Redundant Slot: NONE

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      RPM_PR              UNKNOWN             ---
Reserved Card:      UnReserved          UnReserved          UnReserved
State:              Active              Active              Empty
Serial Number:                                              ---
Prim SW Rev:        ---                 ---                 ---
Sec SW Rev:         ---                 ---                 ---
Cur SW Rev:         ---                 ---                 ---
Boot FW Rev:        ---                 ---                 ---
800-level Rev:                                              ---
800-level Part#:    ---                 000-00000-00
CLEI Code:                                                  ---
Reset Reason:       On Reset From Shell
Card Alarm:         NONE
Failed Reason:      None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:
8850_NY                          System Rev: 02.01   Mar. 01, 2001 13:59:41 PST
MGX8850                                              Node Alarm: CRITICAL

Crossbar Slot Status:      No Crossbar

Alarm Causes
------------
    NO ALARMS
```

Notice that the **dspcd** command display does not display the software versions for the RPM-PR card. To display the software version in use on the RPM-PR card, see "Verifying the Software Version in Use," which appears later in this chapter.

Also notice that the *Reserved Card* status of the front card is *UnReserved*. This status changes to *Reserved* when either an MPLS or a PNNI partition is defined on the RPM card.

Initializing RPM-PR Cards

RPM-PR cards are shipped with the latest software installed on the card and will operate as soon as the card is installed. After you install the card, however, you should initialize the card. Initializing the card does the following configuration:

- Configures the card to use the runtime RPM-PR software image stored on the PXM45 hard disk.
- Configures the card to store the configuration file on the PXM45 hard disk.

Storing the configuration on the hard disk is essential for the following reasons:

- If an active RPM-PR card fails and the configuration is not stored on the disk, the standby RPM-PR card cannot become active.
- The switch **saveallcnf** command cannot store configuration information that is not on the PXM45 hard disk.

When the RPM-PR card starts or reboots, it searches for the configuration file in the following sequence:

- If there is a configuration file only on the PXM45 hard disk, the RPM-PR card uses the configuration stored on the hard disk.
- If there is no configuration file on the hard disk, then the NVRAM version is used.
- If configuration files exist on both the hard drive and bootflash, the switch examines a timestamp tag in each file. If the timestamp tag is the same in both files, the RPM-PR card uses the configuration file stored in bootflash. If the timestamp tag is different, the RPM-PR card uses the configuration file stored on the hard drive.

To initialize an RPM-PR card, use the following procedure.

Step 1 Establish a configuration session with the switch using a user name at any access level.

Note Access to the RPM-PR configuration is secured by the Cisco IOS software running on the card.

Step 2 To display the files that can be used to start RPM-PR cards, enter the **cd** command to select the E:RPM directory, and enter the **ll** command to display the directory contents. For example,

```
pop20two.7.PXM.a > cd E:RPM

pop20two.7.PXM.a > ll
  size          date       time       name
--------       ------     ------    --------
     512    NOV-17-2000  20:01:10   .                 <DIR>
     512    NOV-17-2000  20:01:10   ..                <DIR>
 2334044    DEC-08-2000  02:17:46   rpm-boot-mz_122-4.T
 7695500    DEC-08-2000  02:18:52   rpm-js-mz_122-4.T

In the file system :
    total space :  102400 K bytes
    free  space :  92334 K bytes
```

The file that contains the word *boot* is for booting the card when the regular runtime image, rpm-js-mz_122-4.T in this example, cannot load. The boot file is stored in bootflash on the card, and loaded from that location. The switch never loads the boot code from the PXM45 hard disk. However, it is common practice to store the boot code on the hard disk in preparation for a bootflash upgrade.

Write down the filename for the runtime image. You will have to enter this filename later in this procedure.

Note If the runtime file is missing, you can transfer the correct file to the switch. This procedure is described in Appendix A, "Downloading and Installing Software Upgrades."

Step 3 Use the **cc** command to select the card slot in which the RPM-PR card is installed. For example,

```
pop20two.7.PXM.a > cc 9

(session redirected)

Router>
```

As shown in the example, the switch displays the prompt for the Cisco IOS software on the RPM-PR card.

Step 4 Verify the configuration status of the RPM-PR card by entering the **show bootflash:** command. For example,

```
Router>show bootflash:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. image    BAC7D50E  2B80EC   27  2588780 Jul 12 2001 23:05:26 rpm-boot-mz_122-4.T
2   .. config   0EC2C678  2B84F0   18      898 Jul 12 2001 16:04:41 auto_config_slot09

30178064 bytes available (2589936 bytes used)
```

The **bootflash** contents should contain only the boot file and no configuration files. The example above contains a configuration file (auto_config_slot09), which must be deleted before you initialize the card. Instructions for deleting files appear later in this procedure.

Step 5 Enter enable mode. For example,

```
Router>enable
Password:
Router#
```

Note The default password for Enable mode is supplied with your switch. To secure access to your RPM-PR cards, you should change this password. For information on changing the Enable password, refer to the Cisco IOS documentation.

Step 6 If the bootflash contains any configuration commands, enter the **delete** command to mark them for deletion. For example:

```
Router#delete bootflash:auto_config_slot09
Delete filename [auto_config_slot09]?
Delete bootflash:auto_config_slot09? [confirm]y
```

This command marks files for deletion, but it does not delete them. The next step removes any files marked for deletion.

Step 7 If the bootflash contains configuration files marked for deletion, remove these files by entering the **squeeze** command. For example,

```
Router#squeeze bootflash:
All deleted files will be removed. Continue? [confirm]y
Squeeze operation may take a while. Continue? [confirm]y
Squeeze of bootflash complete
```

To verify the current bootflash contents, enter the **show bootflash:** command.

Step 8 Enter global configuration mode. For example,

```
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
```

Step 9 Enter the boot system command using the following format:

Router(config)# boot system c:<*filename*>

For example:

```
Router(config)#boot system c:rpm-js-mz.122-4.T
```

Step 10 To configure the RPM-PR card to store its configuration on the PXM45 hard disk, enter the boot config command as follows:

```
RPM-PR_LA_9(config)#boot config e:auto_config_slot
```

The RPM-PR configuration file is named: auto_config_*slot*. The *slot* portion of the name must match the slot number that corresponds to the RPM-PR card.

Note The configuration is also stored in NVRAM using the name *startup-config*.

Step 11 Exit global configuration mode and save your changes with the **copy run start** command.

For example,

```
Router(config)#^Z
Router#copy run start
Building configuration...
[OK]
Router#
```

This step ensures that your configuration change will not be lost when the router restarts. It also saves the configuration to the PXM45 hard disk. The following directory listing shows the configuration file that is saved:

```
pop20two.7.PXM.a > cd E:RPM

pop20two.7.PXM.a > ll
  size          date       time       name
--------       ------     ------    --------
     512    NOV-17-2000  20:01:10   .                 <DIR>
     512    NOV-17-2000  20:01:10   ..                <DIR>
 2334044    DEC-08-2000  02:17:46   rpm-boot-mz.122-4.T
 7695500    DEC-08-2000  02:18:52   rpm-js-mz.122-4.T
     553    DEC-16-2000  20:40:24   auto_config_slot09

In the file system :
    total space :  102400 K bytes
    free  space :  92334 K bytes
```

Caution If you do not save the configuration changes, you will have to repeat this procedure.

Step 12 To begin using the new configuration, reset the card from the active PXM45 card. For example:

```
Router#cc 7

(session redirected)

8850_NY.7.PXM.a > resetcd 9
The card in slot number 9, will be reset. Please confirm action
resetcd: Do you want to proceed (Yes/No)? y
```

When the **dspcds** command display shows that the RPM-PR card is active, the initialization is complete.

Verifying the Software Version in Use

To verify which version of software an RPM-PR card is using, you need to use Cisco IOS commands at the router prompt for the RPM-PR card. The following example shows how to do this with the **show version** command:

```
Router#show version
Cisco Internetwork Operating System Software
IOS (tm) RPM Software (RPM-JS-M), Experimental Version 12.1(20001205:224609)
[swtools-rpm21a 242]
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Fri 09-Feb-01 01:17 by
Image text-base: 0x60008960, data-base: 0x61326000

ROM: System Bootstrap, Version 12.1(20001003:080040) [swtools-rommon400 102], DEVELOPMENT
SOFTWARE
BOOTFLASH: RPM Software (RPM-BOOT-M), Experimental Version 12.1(20001010:121621)
[swtools-rpm21.nightly 323]

Router uptime is 0 minutes
System returned to ROM by reload
System image file is "c:rpm-js-mz.122-4.T"

cisco RPM (NPE400) processor with 229376K/32768K bytes of memory.
R7000 CPU at 300Mhz, Implementation 39, Rev 2.1, 256KB L2, 4096KB L3 Cache
Last reset from s/w peripheral
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
1 FastEthernet/IEEE 802.3 interface(s)
1 ATM network interface(s)
125K bytes of non-volatile configuration memory.

32768K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2
```

The following line in the example above is most important:

```
System image file is "c:rpm-js-mz.122-4.T"
```

The system image file line indicates which file was used to load the software currently in use. In this example, the software was loaded from the c: drive, which corresponds to E:/RPM on the switch. The filename shown identifies the source file for the running image. This filename is configured in IOS global configuration mode with the **boot system** command.

Establishing Redundancy Between Two RPM-PR Cards

RPM-PR cards support one-to-n (1:*n*) card redundancy. With 1:*n* redundancy, one RPM-PR card can serve as a secondary or backup card for multiple RPM-PR cards.

Note Primary and secondary cards can run on incompatible software images. However, the software image on the secondary card must be at the same level or higher than the software image on the primary card.

To establish a backup card for an RPM-PR card, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 If you have not done so already, initialize both cards as described earlier in the "Initializing RPM-PR Cards" section.

Step 3 Use the **dspcds** command to verify that both RPM-PR cards are in the "Active" state.

> **Note** The secondary RPM card must not have any configured connections when it is configured for redundancy.

Step 4 Enter the **addred** command as follows:

```
pop20one.7.PXM.a > addred <redPrimarySlotNum> <redSecondarySlotNum> <redType>
```

Replace <*redPrimarySlotNum*> with the slot number of the primary RPM-PR card, and replace <*redSecondarySlotNum*> with the slot number of the secondary RPM-PR card. Replace <*redType*> with the number 2 for 1:*n* redundancy.

After you enter the **addred** command, the switch resets the secondary card; thus, the secondary card will be unavailable for a couple of minutes. When the reset is complete, a **dspcds** command will show the primary and secondary cards in the active and standby states, respectively.

> **Note** The switch only supports RPM-PR cards. If you insert another card type, such as the RPM/B, the addred command will not work.

Step 5 Use the **cc** command to select the card slot in which the primary RPM-PR card is installed. For example:

```
pop20two.7.PXM.a > cc 9
```

Step 6 Enter global configuration mode. For example,

```
Router>enable
Password:
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
```

Step 7 Configure the RPM-PR card to store its configuration on the PXM45 hard disk by entering the **boot config** command as follows:

```
Router>boot config e:auto_config_slot#
```

> **Note** Step 7 is required. When switchover occurs, the secondary RPM-PR card must be able to load the configuration from the auto_config file on the PXM45 hard disk. If this command is already configured in the startup configuration file, you do not need to repeat this command.

Step 8 Enter the **copy run start** command on the primary RPM-PR card to save the configuration changes.

```
Router> copy run start
```

Step 9 To display the redundancy relationship between all cards in the switch, enter the **dspred** command.

For information on managing redundant cards, see the "Managing Redundant Cards" section in Chapter 7, "Switch Operating Procedures."

Configuring SNMP on the RPM-PR Card

To configure the SNMP community string on an RPM-PR card, you need to use Cisco IOS commands at the router prompt for the RPM-PR card. The following example shows how to do this.

Step 1 Login to the RPM card to determine whether the switch interface is active.

```
Router# enable
Router>(enable):show interfaces
```

Step 2 If the switch interface is not active, enter the **config terminal** command to activate it. The following example shows you how to do this.

```
Router# config terminal
Router(config)#int switch 1
Router(config)#no shut
end
```

Step 3 Enter the **show run** command to display the running configuration and verify SNMP information.

```
Router# show run
....
....
snmp-server community public RW
snmp-server community private RW
....
....
```

Step 4 To change the read-write community string, enter the **config terminal** command. The following example shows you how to do this.

```
Router#config terminal
Router(config) snmp-server community POPEYE RW
```

Step 5 Enter the **exit** command to get out of config terminal mode.

```
Router(config)#exit
```

Step 6 Enter the **copy run start** command to save the configuration for use at startup.

```
RPM-PR_LA_9#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
RPM-PR_LA_9#
```

Note The **copy run start** command performs the same function as the older **write mem** command.

Where to Go Next

After the RPM-PR card is initialized and any required redundancy is established, you can configure the RPM-PR card to operate in either of the following roles:

- Label Switch Controller (LSC)
- Label Edge Router (LER)

In either the LSC or the LER role, the RPM-PR communicates with other ATM switches using MPLS AXSM communications links. For instructions on configuring AXSM trunks and lines to support MPLS, see to Chapter 6, “Provisioning AXSM Communication Links.”

When operating in the LER role, the RPM-PR card can use Ethernet connections on the RPM-PR back cards to connect to IP networks. The LSC and LER roles, and the RPM-PR Ethernet connections, are all defined using Cisco IOS commands, which run on the RPM-PR card. To start using Cisco IOS CLI from a switch CLI session, use the **cc** command to change cards to the RPM-PR slot. For instructions on configuring the RPM-PR card with Cisco IOS commands, refer to the *Cisco MGX Route Processor Module Installation and Configuration Guide, Release 2.1*.

CHAPTER 6

Managing PNNI Nodes and PNNI Routing

This chapter provides procedures that you can use to manage Private Network-to-Network Interface (PNNI) nodes and routes. This chapter includes the following sections:

- Managing PNNI Nodes
- Managing PNNI Route and Link Selection
- Displaying Node Configuration Information

Note The concepts behind the procedures in this chapter are introduced in the *Cisco MGX and SES PNNI Network Planning Guide*.

Managing PNNI Nodes

The following sections describe how to configure upper level peer groups and how to manage the PNNI node.

Creating Upper Level Peer Groups

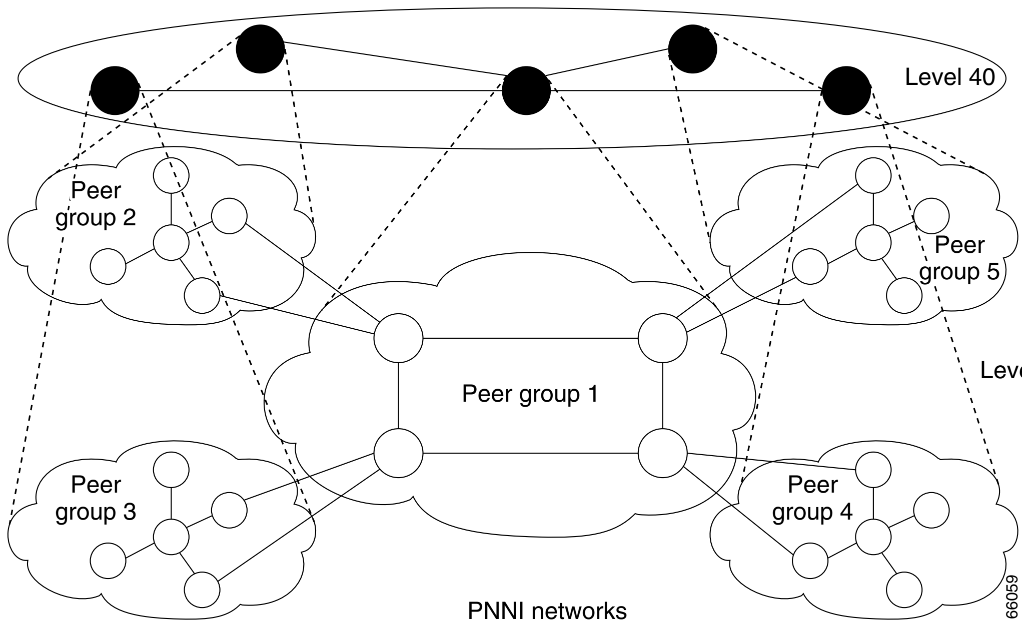
Upper level peer groups enable routing from one PNNI peer group to another. If you are managing a single peer group WAN, you do not need to create upper level peer groups.

Note The "Configuring PNNI Node Parameters" section in Chapter 2, "Configuring General Switch Features," describes how to configure the lowest level peer group parameter. Many upper level peer group parameters are based on the lowest level peer group parameters. You should configure the basic PNNI node parameters before creating upper level peer groups.

After you configure the lowest level PNNI nodes, all nodes within the same peer group can communicate with each other. To enable communications between two nodes in a peer group, add a PNNI trunk between them, as described in the "Cisco AXSM Software Configuration Guide and Command Reference for the MGX 8850 (PXM45) and MGX 8950." To enable routing between different peer groups at the same level, you must create one or more upper level peer groups.

The actual procedure for creating an upper level peer group for your WAN depends on the structure of your WAN. This section shows how to create an upper level peer group for the WAN shown in Figure 6-1.

Figure 6-1 Example Hierarchical PNNI Network Topology Showing a Two-Level Hierarchy



In Figure 6-1, the five level-56 peer groups are isolated from each other until the upper level peer group is created. The members of the upper level peer group are the peer group leaders from the lower level peer groups. To create an upper level peer group, you need to configure the peer group leaders and add the upper level PNNI process to each peer group leader (PGL) node. It is also a good practice to configure secondary peer group leaders that can take over if a PGL fails.

To configure peer group leaders, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Add the upper level PNNI logical node that will participate in the higher level PNNI group using the following command.

```
8950_SF.7.PXM.a > addpnni-node level
```

Replace level with the PNNI level for the higher level peer group. The PNNI level value must be smaller than the level value for the lower level peer groups. The following example creates a logical PNNI node at PNNI level 48.

```
8950_SF.7.PXM.a > addpnni-node 48
```

Note You need to complete this step for all nodes that will serve as PGLs or backup PGLs.

Step 3 Display the current PGL priority of the node that will become PGL or a back up PGL by entering the **dsppnni-election** command as shown in the following example:

```
8950_SF.7.PXM.a > dsppnni-election

node index: 1
   PGL state......     OperNotPgl     Init time(sec).......        15
   Priority.......              0     Override delay(sec)..        30
                                      Re-election time(sec)        15
   Pref PGL..............0:0:00.000000000000000000000000.000000000000.00
   PGL...................0:0:00.000000000000000000000000.000000000000.00
   Active parent node id..0:0:00.000000000000000000000000.000000000000.00



node index: 2
   PGL state......       Starting     Init time(sec).......        15
   Priority.......              0     Override delay(sec)..        30
                                      Re-election time(sec)        15
   Pref PGL..............0:0:00.000000000000000000000000.000000000000.00
   PGL...................0:0:00.000000000000000000000000.000000000000.00
   Active parent node id..0:0:00.000000000000000000000000.000000000000.00
```

In the example above, the PGL state indicates the PGL status of each of two logical nodes, and the priority value is what is used to determine if the node will become PGL. Since a PGL represents the peer group at a higher level, logical node 1 (node index 1) is the only node that can become a PGL. In this example, both logical nodes are set to the default value 0, and this value prevents a node from becoming a peer group leader.

Step 4 Set the PNNI priority for the node with the **cnfpnni-election** command as follows:

```
8950_SF.7.PXM.a > cnfpnni-election node-index -priority value
```

Replace *node-index* with the index that identifies the logical node you are modifying, and replace *value* with the new priority value. A zero value prevents the node from becoming a PGL. If only one node in a peer group has a non-zero priority, that node will become PGL. If multiple nodes have non-zero priority values, the node with the highest priority value becomes PGL. The following example shows what happens after you set the priority level and view the PGL status.

```
8950_SF.7.PXM.a > cnfpnni-election 1 -priority 200

8950_SF.7.PXM.a > dsppnni-election

node index: 1
   PGL state...... AwaitUnanimity     Init time(sec).......        15
   Priority.......            200     Override delay(sec)..        30
                                      Re-election time(sec)        15
   Pref PGL..............56:160:47.00918100000100036b5e31b3.00036b5e31b3.01
   PGL...................0:0:00.000000000000000000000000.000000000000.00
   Active parent node id..0:0:00.000000000000000000000000.000000000000.00



node index: 2
   PGL state......       Starting     Init time(sec).......        15
   Priority.......              0     Override delay(sec)..        30
                                      Re-election time(sec)        15
   Pref PGL..............0:0:00.000000000000000000000000.000000000000.00
   PGL...................0:0:00.000000000000000000000000.000000000000.00
   Active parent node id..0:0:00.000000000000000000000000.000000000000.00
```

The first time the **dsppnni-election** command was entered, the PGL state was OperNotPgl, which means that the node is operating, but is not operating as a PGL. After the priority is changed, the PGL state changes to AwaitUnanimity, which means the node is communicating with the other nodes in its peer group to see if it has the highest priority and should be PGL. If you enter the **dsppnni-election** command again after about 15 seconds, the PGL state changes as shown in the following example:

```
8950_SF.7.PXM.a > dsppnni-election

node index: 1
   PGL state......         OperPgl     Init time(sec).......        15
   Priority.......             250     Override delay(sec)..        30
                                       Re-election time(sec)        15
   Pref PGL..............56:160:47.00918100000100036b5e31b3.00036b5e31b3.01
   PGL...................56:160:47.00918100000100036b5e31b3.00036b5e31b3.01
   Active parent node id..48:56:47.00918100000100000000000.00036b5e31b3.00



node index: 2
   PGL state......      OperNotPgl     Init time(sec).......        15
   Priority.......               0     Override delay(sec)..        30
                                       Re-election time(sec)        15
   Pref PGL..............0:0:00.000000000000000000000000.000000000000.00
   PGL...................0:0:00.000000000000000000000000.000000000000.00
   Active parent node id..0:0:00.000000000000000000000000.000000000000.00
```

In the example above, the PGL state changes to show that logical node 1 is now the PGL. Notice that the priority value is 250. An earlier example in this procedure set the priority to 200. When a node is elected PGL, the node adds 50 to its priority value to prevent instability that might be caused by other peer group nodes with a marginally higher priority value.

Step 5 Repeat this procedure for backup peer group leaders and be sure to set their priority value to a lower value so that they operate as backup PGLs.

Enabling and Disabling Routes Through a Node

The restricted transit option allows you to allow or block call routes that pass through the node and terminate on other nodes. The default setting for this option enables calls to pass through.

To enable or disable PNNI routing through a node, enter the **cnfpnni-node** command as follows:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> -transitRestricted on|off
```

Replace *node-index* with the index that identifies the logical node you are modifying, and enter either *on* or *off* for the -transitRestricted parameter. When this parameter is set to on, the node only accepts calls that terminate on this node. When the -transitRestricted parameter is set to off, the node accepts calls that pass through the node and terminate on other nodes.

To view the status of the -transitRestricted option, enter the **dsppnni-node** command as shown in the following example:

```
8850_LA.7.PXM.a > dsppnni-node

node index: 1                      node name: 8850_LA
   Level..............        56     Lowest.............      true
   Restricted transit..       on     Complex node........      off
   Branching restricted       on
   Admin status........       up     Operational status..       up
   Non-transit for PGL election..      off
   Node id..............56:160:47.00918100000100001a531c2a.00001a531c2a.01
   ATM address..........47.00918100000100001a531c2a.00001a531c2a.01
   Peer group id.........56:47.00.9181.0000.0100.0000.0000.00
```

Enabling and Disabling Point-to-Multipoint Routes

The branching restricted option allows you to allow or block point-to-multipoint calls. The default setting for this option enables point-to-multipoint calls.

To enable or disable point-to-multipoint routes through a node, enter the **cnfpnni-node** command as follows:

```
8850_LA.7.PXM.a > cnfpnni-node <node-index> -branchingRestricted on|off
```

Replace *node-index* with the index that identifies the logical node you are modifying, and enter either *on* or *off* for the -branchingRestricted parameter. When this parameter is set to on, the node does not accept point-to-multipoint calls. When the -branchingRestricted parameter is set to off, the node accepts point-to-multipoint calls.

To view the status of the -branchingRestricted option, enter the **dsppnni-node** command as shown in the following example:

```
8850_LA.7.PXM.a > dsppnni-node

node index: 1                      node name: 8850_LA
   Level..............        56     Lowest.............      true
   Restricted transit..      off     Complex node........      off
   Branching restricted       on
   Admin status........       up     Operational status..       up
   Non-transit for PGL election..      off
   Node id..............56:160:47.00918100000100001a531c2a.00001a531c2a.01
   ATM address..........47.00918100000100001a531c2a.00001a531c2a.01
   Peer group id.........56:47.00.9181.0000.0100.0000.0000.00
```

Adding an ATM Summary Address Prefix

Enter the **addpnni-summary-addr** command to add an ATM summary address prefix for a PNNI logical node on the switch.

```
Geneva.7.PXM.a > addpnni-summary-addr <node-index> <address-prefix> <prefix-length> [-type]
[-suppress] [-state]
```

Table 6-1 lists the parameter descriptions for the **addpnni-summary-addr** command.

Table 6-1 Parameters for addpnni-summary-addr Command

Parameter	Description
node-index	The node index assigned to a PNNI logical node on a network. Range = 1–65535
address-prefix	ATM address prefix assigned to the network.
prefix-length	Length of the summary address-prefix in number of bits, equal or less than 152 bits. Currently, the zero-length summary address is not supported.
-type	Type of the summary address.
-suppress	True = summary address is not advertised.
-state	Summary address is advertised | notadvertised | inactive.

Configuring SVCC RCC Variables

Configure SVCC-based RCC variables with the **cnfpnni-svcc-rcc-timer** command.

```
Geneva.7.PXM.a > cnfpnni-svcc-rcc-timer <node-index> [-initTime] [-retryTime]
[-callingIntegrityTime] [-calledIntegrityTime]
```

This defines a node's initial PNNI SVCC-based variables, as shown in Table 6-2.

Table 6-2 Parameters for cnfpnni-svcc-rcc-timer Command

Parameter	Description
nodeIndex	Node index.
-initTime	Time (in seconds) that the node delays establishment of an SVCC to a neighbor with a numerically lower ATM address, after determining that such an SVCC should be established.
-retryTime	Time (in seconds) that the node delays before attempting to re-establish an SVCC-based RCC after the RCC is unexpectedly torn down.
-callingIntegrityTime	Time (in seconds) that the node waits for a sent SVCC to become fully established before giving up and tearing it down.
-calledIntegrityTime	Time (in seconds) that the node waits for a received SVCC to become fully established before giving up and tearing it down.

Configuring Routing Policies for Background Routing Tables

Configure the routing policies used for background routing tables generation with the **cnfpnni-routing-policy** command.

```
Geneva.7.PXM.a > cnfpnni-routing-policy [-sptEpsilon] [-sptHolddown] [-bnPathHolddown]
[-loadBalance] [-onDemand] [-awBgTable] [-ctdBgTable] [-cdvBgTable]
```

Table 6-3 lists the parameter descriptions for the **cnfpnni-routing-policy** command.

Table 6-3 Parameters for cnfpnni-routing-policy Command

Parameter	Description
-sptEpsilon	Indicates the node's policy in determining equal-cost path during routes calculation.
-sptHolddown	Defines the node's minimum time interval between two consecutive calculations for generating routing tables.
-bnPathHolddown	Defines the minimum time interval between two consecutive calculations for generating border node path in a peer group for a complex node representation at the next higher level. (Complex nodes are not supported by MGX 8850, Release 3 software image)
-loadBalance	Defines the node's load balancing rule if alternative equal-lose routes exist for the call request.
-onDemand	Defines the node's on-demand routing rule as one of the following routing rules: firstfit = select a route that is the first it can find bestfit = select the best route Default = **firstfit**
-awBgTable	Enable or disable administrative weight for the background routing table. Default = **off**
-ctdBgTable	Enable or disable CTD for the background routing table. Default = **off**
-cdvBgTable	Enable or disable CDV for the background routing table. Default = **off**

Configuring PNNI Timers

Configure the PNNI timers with the **cnfpnni-timer** command.

`Geneva.7.PXM.a >` **`cnfpnni-timer`** <*node-index*>

You can define the initial PNNI timer values and significant change thresholds of a PNNI logical node. Table 6-4 lists the parameter descriptions for the **cnfpnni-timer** command.

Table 6-4 Parameters for cnfpnni-timer Command

Parameter	Description
node-index	Logical node's node index.
-ptseholddown	The number is used as a multiplier of the Hello interval of the peer neighbor: the product is the maximum time that the neighbor is considered to be alive without the reception of its Hello packets. Range: (0.1–10) second Default = 1
-helloholddown	Value for the Hello hold down timer that limits the rate at which it sends Hellos.
-hellointerval	Initial value for the Hello timer.
-helloinactivityfactor	Inactivity time factor on a horizontal link between two logical nodes.
-ptserefreshinterval	Time allowed for the PTSE to re-originate.
-ptselifetimefactor	Value for the lifetime multiplier, expressed as a percentage. The product of ptselifetimefactor and the ptserefreshinterval sets the remaining lifetime of a self-originated PTSE.
-retransmitinterval	Period between retransmissions of unacknowledged DS, PTSE request, and PTSP.
-ptsedelayedackinterval	Minimum time allowed between transmissions of delayed PTSE acknowledgment packets.
-avcrpm	Proportional multiplier used in the algorithms that determines significant change for AvCR parameters.
-avcrmt	Minimum threshold used in the algorithms that determine significant change for AvCR parameters.
-cdvpm	Proportional multiplier used in the algorithms that determine significant change for CDV parameters.
-ctdpm	Proportional multiplier used in the algorithms that determine significant change for CTD parameters.

Managing PNNI Route and Link Selection

The following sections describe how to control route and link selection for the links on each PNNI node.

Configuring the Route Selection Method (First Fit or Best Fit)

When the PNNI controller searches for routes, it can choose the first route that meets the call requirements, or it can choose the route that provides the best performance. The first fit method chooses the first available route and reduces call processing time. The best fit method chooses the optimum route, but it takes longer to select the route. The default setting is first fit.

Note The route selection process is described in the *Cisco MGX and SES PNNI Network Planning Guide*.

To configure the route selection method, enter the **cnfpnni-routing-policy** command as follows:

```
8850_LA.7.PXM.a > cnfpnni-routing-policy -onDemand firstfit|bestfit
```

Enter *firstfit* to select the first route discovered, or enter *bestfit* to select the optimum route.

To display the route selection method, enter the **dsppnni-routing-policy** command as follows:

```
8850_LA.7.PXM.a > dsppnni-routing-policy

   SPT epsilon.........          0     Load balance........    random
   SPT holddown time...          1     On demand routing... first fit
   SPT path holddown time        2     AW Background Table         on
   CTD Background Table         on     CDV Background Table        on
```

The parameter labeled *On demand routing* shows which route selection method is configured.

Configuring the Best-Fit Route Selection Method

When the PNNI controller is configured to choose the best route and it discovers multiple eligible routes, the load balancing option determines which route to select. The option settings are random and maxbw, which selects the route with the greatest available bandwidth. Random selection is used to balance the load.

Note The route selection process is described in the *Cisco MGX and SES PNNI Network Planning Guide*.

To configure the best-fit route selection method, enter the **cnfpnni-routing-policy** command as follows:

```
8850_LA.7.PXM.a > cnfpnni-routing-policy -loadBalance random|maxbw
```

Enter *random* to balance route selection, or enter *maxbw* to select the route with the greatest available bandwidth.

To display the route selection method, enter the **dsppnni-routing-policy** command as follows:

```
8850_LA.7.PXM.a > dsppnni-routing-policy

   SPT epsilon.........          0     Load balance........    random
   SPT holddown time...          1     On demand routing... first fit
   SPT path holddown time        2     AW Background Table         on
   CTD Background Table         on     CDV Background Table        on
```

The parameter labeled *Load balance* shows which best-fit route selection method is configured.

Configuring Preferred Routes

You can specify a route to be preferred for SPVC and SPVP connections. Once a route is specified as a preferred route, future SPVC connections attempt to route connections via the preferred route before attempting other routes. A preferred route can be assigned to multiple SPVCs or SPVPs.

Preferred routes can be configured to be a *directed* or *non-directed*. A directed route will only attempt a connection on the preferred route. If the connection cannot route over the preferred route, that connection will go into a failed state. A*non-directed* route will first attempt to route over the preferred route. If the preferred route is not available, the connection will be attempted over other routes.

Note Release 3 of the MGX switches supports up to 5000 preferred routes per switch.

A preferred route consists of a sequential list of nodes and links between nodes that stretch from the local node to the destination node. Each node and link in the preferred route must be within the same peer group as the originating node. A node can appear only once in the preferred route. Each preferred route supports a Maximum of 19 hops away from the local node (up to 20 nodes, including the local node, or 19-NNI links).

Configuring a Preferred Route

Use the following procedure to configure a preferred route.

Step 1 Enter the **dsptopondlist** command to see the nodes in this database. These are the nodes you can use to set up your preferred route.

```
U1.8.PXM.a > dsptopondlist

Number of Entries = 3

Table Index: 1  Node Name: U1
Node ID: 56:160:47.00918100000000107b65f291.00107b65f291.01
Primary IP: 0.0.0.0
Primary IP Type: atm0
Secondary IP: 0.0.0.0
Secondary IP Type: lnPci0
SysObjId: 1.3.6.1.4.1.9.1.228
Gateway Mode DISABLED
PTSE in DB: YES

Table Index: 2  Node Name: D1
Node ID: 56:160:47.00918100000000107be99820.00107be99820.01
Primary IP: 0.0.0.0
Primary IP Type: atm0
Secondary IP: 0.0.0.0
Secondary IP Type: atm0
SysObjId: NOT AVAILABLE
Gateway Mode DISABLED
PTSE in DB: NO

Type <CR> to continue, Q<CR> to stop:
```

Step 2 Enter the **addpref** command to set up your preferred route as follows:

```
8850_LA.7.PXM.a > addpref [-name <yes|no>] [-h1 <persNodeIndex/portId>]...[-h20
<persNodeIndex/portId>]
```

Table 6-5 describes the **addpref** command parameters.

Table 6-5 Parameters for addpref Command

Parameter	Description
-name	Name of the preferred route. To use node names, type -name *yes*. The choice is *yes* or *no*. A *no* means that the persistent node index is used. Default = no For more information on the preferred route naming conventions, see the section, "Detailed Usage Guidelines for the addpref Command" In the "MGX 8850 and MGX 8950 Switch Command Reference."
-h1, -h2 ...-h20	Specifies each hop in the preferred route. Including the local node, you can define up to 20 nodes in the preferred route. Each hop in the preferred route is defined by a pairing of the persistent node index and the PNNI physical port ID. For the last port ID in the route, type a "#" instead of a numeric value. This # appears in the outputs of the display commands for preferred routes. Separate these values by a slash and no spaces, as follows: persNodeIndex/portid The node must exist in the persistent topology database. Use the **dsptopondlist** command to see the nodes in this database. (An alternate to using node indexes is using node names.) The format for portid is slot:subslot.port:subport.

Note After you creates a preferred route, the system returns a route index in the range 1-5000. This route index is necessary for related commands, such as **delpref**, **dsppref**, and **modpref**. To see a list of route indexes, use the **dspprefs** command.

Step 3 Enter the **dsppref** <*rte_index*> [-name {*yes*|*no*}] command to verify the preferred route was configured correctly. Replace <*rte_index*> with the preferred routes index number. If you wish to view the preferred route name, include the -name *yes* option in the command.

Once you have set up a preferred route, you can associate it with an SPVC or and SPVP. Each connection can have only one preferred route. If a connection already has a preferred route associated with it, you can replace that route with a new one.

Associating an SPVC or an SPVP with a Preferred Route

Use the following procedure to associate an SPVC or SPVP with a preferred route.

Step 1 Create the preferred route by the **addpref** command, as shown in the previous section.

Step 2 If not already done, create the SPVC/SPVP by using the **addcon** command, as described in

Step 3 Enter the **cnfconpref** <*options*> command to associate an SPVC or SPVP with a preferred route.

Table 6-6 describes the **cnfconpref** command parameters.

Table 6-6 Parameters for cnfconpref Command

Parameter	Description
portid	Identifies a PNNI physical port, in the format slot:subslot.port:subport
vpi	VPI of the connection. Range: 0-255 on a UNI, 0-4095 on an NNI Default: none
vci	VCI of the connection. If the VCI is 0, the connection is an SPVP. Range: 1-65535 Default: none
rteID	The route identifier. Range: 1-5000 Default: none
-assoc	The -assoc option either associates (-assoc set) or disassociates (-assoc clr) the specified route to the specified connection. If you type -assoc set to associate a route, the command entry must include the route ID. If you disassociate the route by typing -assoc clr, the route ID is unnecessary. Because set is the default, if you type a route ID but do not include -assoc set, the protocol interprets the command as an attempt to associate the specified route to the specified connection. Possible entries: set or clr (for clear) Default: set

Table 6-6 Parameters for cnfconpref Command

-direct	Change the directed route status. A directed route means the preferred route associated with the connection is the only route the connection can take. If the preferred route is not available, the connection is failed. Type -direct yes to make the route identified by rteID a directed route for the associated connection. The connection is identified by *portid vpi vci*. Possible entries: yes or no Default: no
-onPrefRte	Informs the node that the connection is routed on its associated, preferred route. The purpose is to prevent rerouting of the connection during grooming. The possible entries are *yes* or *no.* Before setting this the onPrefRte option to *yes*, enter the **dspcon** <*portid*> <*vpi*> <*vci*> command to ensure that the connection is properly routed on the preferred route. Default: no

Modifying a Preferred Route

Use the **modpref** command to change a preferred route. You can re-specify existing hops in a route or add one or more hops to an existing route. You can also change a hop to indicate that it is the destination node. A new destination node must have the highest hop number in the route. (See the detailed usage guidelines for the **addpref** command for details.)

Enter the **modpref** command as follows:

```
8850_LA.7.PXM.a > modpref [-name <yes/no>] [-h1 {<persNodeIndex>/<portId>}]
[-h2 {<persNodeIndex>/<portId>}] ... [-h20 {<persNodeIndex>/<portId>}]
```

Table 6-7 describes the **modpref** command parameters.

Table 6-7 modpref Command Parameters

Parameter	Description
rteID	The preferred route identifier has a range of 1-5000.
-name	Enter yes to specify that the node identifier is actually the name of the node. You can see the current choice for node identifier (either by index or name) by using the **dsppref** command. To identify the name or persistent index number by using the **dsptopondlist** command. Default = no For more information on the preferred route naming conventions, see the section, “Detailed Usage Guidelines for the addpref Command” In the “MGX 8850 and MGX 8950 Switch Command Reference.”
-h1, -h2 ...-h20	Specifies each hop in the preferred route. Including the local node, you can define up to 20 nodes in the preferred route. Each hop in the preferred route is defined by a pairing of the persistent node index and the PNNI physical port ID. The <*persNodeIndex*> (persistent node index) is a namestring. You need to enter this option only if you include the -name *yes* option in the **modpref** command. **Note** If you entered **modpref** -name *no* command, or if you do not specify the -name option in the command, then <*persNodeIndex*> refers to a table index derived from the persistent topology database. Enter the **dsptopondlist** command to view the table index. For the last port ID in the route, type a “#” instead of a numeric value. This # appears in the outputs of the display commands for preferred routes. Separate these values by a slash and no spaces, as follows: persNodeIndex/portid The node must exist in the persistent topology database. Use the **dsptopondlist** command to see the nodes in this database. (An alternate to using node indexes is using node names.) The format for portid is slot:subslot.port:subport.

The preferred routes are specified by the **addpref** command. To see a list of all preferred routes and obtain the required route index for the modpref command, use the **dspprefs** command. To see details about individual preferred route, use the **dsppref** command.

Deleting a Preferred Route

Enter the **delpref** <*rteId*> command to delete a route. Replace <*rteId*> with the route identifier for the appropriate route, in the range from 1 through 5000.

Configuring Link Selection for Parallel Links

When parallel links exist between two nodes on a route, the node closest to the originating node selects a link based on one of the following parameters:

- The lowest Administrative Weight (minaw)
- The maximum available cell rate (maxavcr)
- The maximum cell rate configured for the link (maxcr)
- Random link selection (loadbalance)

Note The route selection process is described in the *Cisco MGX and SES PNNI Network Planning Guide*.

To configure the link selection method, enter the **cnfpnni-link-selection** command as follows:

```
8850_LA.7.PXM.a > cnfpnni-link-selection pnportid minaw|maxavcr|maxcr|loadbalance
```

Replace *pnportid* with the port ID in the format slot[:subslot].port[:subport]. (This is the same format that appears when you display ports with the *dsppnport* command.) Enter one link selection method after the port ID.

To display the link selection method, enter the **dsppnni-link-selection** command as follows:

```
8850_LA.7.PXM.a > dsppnni-link-selection 1:2.1:1

physical port id:         1:2.1:1     link selection: minaw
 logical port id:        16848897
```

Configuring the Maximum Bandwidth for a Link

The maximum bandwidth for a link is defined when a PNNI partition is configured for a port. For more information, see Chapter 6, “Provisioning AXSM Communication Links.”

Configuring the Administrative Weight

The link administrative weight (AW) is used to calculate the total cost of a route and can be used by the PNNI controller when it has to choose between multiple parallel links. You can assign different AW values for each ATM class of service.

Note The role of AW in route and link selection is described in more detail in the *Cisco MGX and SES PNNI Network Planning Guide*.

To configure the AW for a link, enter the **cnfpnni-intf** command as follows:

```
8850_LA.7.PXM.a > cnfpnni-intf <pnportid> [-awcbr] [-awrtvbr] [-awnrtvbr] [-awabr]
[-awubr] [-awal]
```

Replace *pnportid* with the port ID in the format slot[:subslot].port[:subport]. (This is the same format that appears when you display ports with the **dsppnport** command.) For each class of service for which you want to change the AW value, enter the appropriate option followed by the new value. For example, the following command sets the AW for CBR calls over the link:

```
8850_LA.7.PXM.a > cnfpnni-intf 1:2.1:1 -awcbr 2000
```

To display the AWs assigned to a PNNI port, enter the **dsppnni-intf** command as follows:

```
8850_LA.7.PXM.a > dsppnni-intf 1:2.1:1

Physical port id: 1:2.1:1          Logical port id:   16848897
   Aggr token..........         0     AW-NRTVBR...........      5040
   AW-CBR..............      2000     AW-ABR..............      5040
   AW-RTVBR............      5040     AW-UBR..............      5040
```

Configuring the Bandwidth Overbooking Factor

The bandwidth overbooking factor represents the percentage of the actual available bandwidth that is advertised for links as the available cell rate (ACR). The default overbooking factor is 100, and this specifies that 100% of the actual available bandwidth should be advertised as the ACR. When the overbooking factor is set below 100, a link is oversubscribed because the bandwidth booked for each connection exceeds the configured bandwidth for the connection. When the overbooking factor is set above 100, the link is undersubscribed because the bandwidth booked for a connection exceeds the connection's configured bandwidth.

Note For more information on the bandwidth overbooking factor, refer to the *Cisco MGX and SES PNNI Network Planning Guide*.

To configure the bandwidth overbooking factor for a PNNI port, enter the **cnfpnportcac** command as follows:

```
8850_LA.7.PXM.a > cnfpnportcac <pnportid> <service_catogory>
[-bookfactor <utilization-factor>]
```

Replace *pnportid* with the port ID in the format slot[:subslot].port[:subport]. (This is the same format that appears when you display ports with the *dsppnport* command.) Replace *service_catogory* with the ATM class of service for which you are defining the overbooking factor, and replace *utilization-factor* with the new overbooking factor. For example:

```
8850_LA.7.PXM.a > cnfpnportcac 1:2.1:1 cbr -bookfactor 120
WARNING: New CAC parameters apply to existing connections also
```

To display the bandwidth overbooking factor for all classes of service, enter the **dsppnportcac** command as shown in the following example:

```
8850_LA.7.PXM.a > dsppnportcac 1:2.1:1

                  cbr:       rt-vbr:       nrt-vbr:          ubr:          abr:
sig:
bookFactor:       120%          100%           100%          100%          100%
100%
maxBw:       100.0000%     100.0000%      100.0000%     100.0000%    100.0000%
100.0000%
minBw:         0.0000%       0.0000%        0.0000%       0.0000%      0.0000%
0.3473%
```

```
maxVc:            100%         100%         100%         100%         100%
100%
minVc:              0%           0%           0%           0%           0%
1%
maxVcBw:            0            0            0            0            0
0
```

Displaying Node Configuration Information

The following sections describe commands that display PNNI configuration information.

Displaying the PNNI Node Table

Once a PNNI node is configured, enter the **dsppnni-node** command to show the WAN nodal table. The node list is displayed in ascending order of each node index, all with one setting the node to the lowest PNNI hierarchy.

The significant information that will display is as follows:

- Node index
- Node name
- Node level (56 for all nodes until multiple peer groups are supported)
- Restricted transit—a flag that can prevent PNNI routing from transmitting this node
- Branching restricted—a flag that can prevent cpu-intensive branching at this node
- Admin status—up/down
- Operational status—up/down
- Nontransit for PGL election—a flag that indicates that node's level of eligibility as a PGL
- Node id—The 22-byte PNNI logical identification
- ATM address
- pg id—Peer group ID

The following example shows the report for this command:

```
Geneva.7.PXM.a > dsppnni-node
node index: 1                      node name: Geneva
   Level...............        56     Lowest..............      true
   Restricted transit..       off     Complex node........       off
   Branching restricted        on
   Admin status........        up     Operational status..        up
   Non-transit for PGL election..       off
   Node id...............56:160:47.00918100000000030ff0fef38.0030ff0fef38.01
   ATM address...........47.00918100000000030ff0fef38.0030ff0fef38.01
   Peer group id.........56:47.00.9181.0000.0000.0000.0000.00
Geneva.7.PXM.a >
```

Displaying the PNNI Summary Address

Enter the **dsppnni-summary-addr** command to display PNNI summary addresses as follows:

```
Geneva.7.PXM.a > dsppnni-summary-addr [node-index]
```

If you specify the node-index, this command displays the summary address prefixes of the node-index PNNI node.

If you do not specify the node-index, this command displays summary address prefixes for all local nodes on the network.

Table 6-8 shows the objects displayed for the **dsppnni-summary-addr** command.

Table 6-8 Objects Displayed for dsppnni-summary-addr Command

Parameter	Description
node-index	The node index number assigned to a PNNI logical node on a network. Replace [*node-index*] with a number in the range from 1 to 65535.
addressprefix	The ATM address prefix assigned to the network.
prefixlength	The length of the summary address-prefix in number of bits, equal or less than 152 bits. Currently, the zero-length summary address is not supported.
-type	The type of the summary address.
-suppress	true = summary address is not advertised.
-state	The summary address state can be advertising, notadvertised, or inactive.

This example shows the **dsppnni-summary-addr** command line that displays the PNNI address prefixes.

```
8850_LA.7.PXM.a > dsppnni-summary-addr

node index: 1
   Type..............    internal     Suppress..............   false
   State............. advertising
   Summary address........47.0091.8100.0000.0000.1a53.1c2a/104
```

Displaying System Addresses

The **dsppnsysaddr** command is more specific; it displays the following list of addresses from the System Address Table:

- ilmi
- uni
- static
- host

The following example shows the report for this command:

```
Geneva.7.PXM.a > dsppnsysaddr
47.0091.8100.0000.0030.ff0f.ef38.0000.010b.180b.00/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0030.ff0f.ef38.0000.010b.1816.00/160
Type:     host     Port id:   17251106
```

```
47.0091.8100.0000.0030.ff0f.ef38.0000.010b.1820.00/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0030.ff0f.ef38.0000.010b.1821.00/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0030.ff0f.ef38.0000.010d.1820.00/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0030.ff0f.ef38.0000.010d.1821.00/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0030.ff0f.ef38.0000.010d.1822.00/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0030.ff0f.ef38.0000.010d.180b.00/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0030.ff0f.ef38.0030.ff0f.ef38.01/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0030.ff0f.ef38.0030.ff0f.ef38.99/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0030.ff0f.ef38.1111.1101.0001.01/160
Type:     host     Port id:   17251106

47.0091.8100.0000.0050.0fff.e0b8/104
Type:   static     Port id:   17635339

39.6666.6666.6666.6666.6666.6666.6666.6666.6666/152
Type:      uni     Port id:   17504267

Geneva.7.PXM.a >
```

Displaying PNNI Interface Parameters

Enter the **dsppnni-intf** command to display the service category-based administrative weight and aggregation token parameters.

```
Geneva.7.PXM.a > dsppnni-intf [node-index] [port-id]
```

The following example shows the report for this command:

```
Geneva.7.PXM.a > dsppnni-intf 11:2.2:22
Physical port id: 11: 2.2:22       Logical port id:   17504278
   Aggr token..........        0     AW-NRTVBR...........      5040
   AW-CBR..............     5040     AW-ABR..............      5040
   AW-RTVBR............     5040     AW-UBR..............      5040
Geneva.7.PXM.a >
```

Table 6-9 describes the objects displayed for the **dsppnni-intf** command.

Table 6-9   Objects Displayed for the dsppnni-intf Command

Parameter	Description
portid	Port Identifier.
token	The 32-bit number used for link aggregation purpose.
aw	The 24-bit number used as administrative weight on this interface. The maximum possible value is a 24-bit unsigned integer.

Displaying the PNNI Link Table

Enter the **dsppnni-link** command to show the PNNI link table.

```
Geneva.7.PXM.a > dsppnni-link [node-index] [port-id]
```

If you specify.

- Both <*node-index*> and <*port-id*>, the command displays information about that specific <*port-id*> port.
- Only <*node-index*>, the command displays information about all PNNI link attached to the <*node-index*> node.
- Nothing, command displays all links attached to all PNNI nodes on this switching system.

The final option allows you to see all communication lines in the PNNI network.

The following example shows the report for this command:

```
Geneva.7.PXM.a > dsppnni-link

node index   : 1
Local port id:   17504278          Remote port id:   17176597
Local Phy Port Id: 11:2.2:22
   Type. lowestLevelHorizontalLink     Hello state....... twoWayInside
   Derive agg...........         0     Intf index...........  17504278
   SVC RCC index........         0     Hello pkt RX.........     17937
                                       Hello pkt TX.........     16284
   Remote node name.......Paris
   Remote node id.........56:160:47.00918100000000107b65f27c.00107b65f27c.01
   Upnode id.............0:0:00.000000000000000000000000.000000000000.00
   Upnode ATM addr........00.000000000000000000000000.000000000000.00
   Common peer group id...00:00.00.0000.0000.0000.0000.0000.00

node index   : 1
Local port id:   17504288          Remote port id:   17045536
Local Phy Port Id: 11:2.1:32
   Type. lowestLevelHorizontalLink     Hello state....... twoWayInside
   Derive agg...........         0     Intf index...........  17504288
   SVC RCC index........         0     Hello pkt RX.........     18145

Type <CR> to continue, Q<CR> to stop:
```

```
                                     Hello pkt TX.........     19582
   Remote node name.......SanJose
   Remote node id.........56:160:47.00918100000000309409f1f1.00309409f1f1.01
   Upnode id..............0:0:00.000000000000000000000000.000000000000.00
   Upnode ATM addr........00.000000000000000000000000.000000000000.00
   Common peer group id...00:00.00.0000.0000.0000.0000.0000.00

node index   : 1
Local port id:   17504289          Remote port id:   17045537
Local Phy Port Id: 11:2.1:33
   Type. lowestLevelHorizontalLink     Hello state....... twoWayInside
   Derive agg...........         0     Intf index...........  17504289
   SVC RCC index........         0     Hello pkt RX.........     17501
                                       Hello pkt TX.........     18877
   Remote node name.......SanJose
   Remote node id.........56:160:47.00918100000000309409f1f1.00309409f1f1.01
   Upnode id..............0:0:00.000000000000000000000000.000000000000.00
   Upnode ATM addr........00.000000000000000000000000.000000000000.00
   Common peer group id...00:00.00.0000.0000.0000.0000.0000.00
```

Displaying the PNNI Routing Policy

Enter the **dsppnni-routing-policy** command to display the routing policies used for background routing tables generation:

```
Geneva.7.PXM.a > dsppnni-routing-policy
```

The following example shows the report for this command:

```
Geneva.7.PXM.a > dsppnni-routing-policy
   SPT epsilon.........         0     Load balance........    random
   SPT holddown time...         1     On demand routing...  best fit
   SPT path holddown time       2     AW Background Table         on
   CTD Background Table        on     CDV Background Table        on
Geneva.7.PXM.a >
```

Table 6-10 describes the objects displayed for the **dsppnni-routing-policy** command.

Table 6-10 Objects Displayed for the dsppnni-routing-policy Command

Parameter	Description
sptEpsilon	The tolerance used during route calculation to determine which paths qualify as equal-cost. The range is from 0—20.
sptHolddown	The interval between two consecutive calculations for generating routing tables. The range is from 1 (0.1 sec) to 600 (60 sec).
bnPathHolddown	The minimum time that can elapse between consecutive calculations that generate routing tables for border nodes. The range is from 2 (0.2 sec) to 600 (60 sec).
-loadBalance	Defines the load balancing rule if alternative equal-cost routes exist for a given call request.

Table 6-10 Objects Displayed for the dsppnni-routing-policy Command

Parameter	Description
onDemand	The on-demand routing rule. On-demand routing is used. *Firstfit* routing selects the first route found that goes to the selected destination. Firstfit route search time is minimized, but the selected route is not optimum. *Bestfit* routing selects a route based on the least-cost. The average route- search-time is greater, and more CPU-intensive, but the optimum route is selected.
awBgTable	Displays whether the administrative weight for the background routing table is enabled or disabled.
ctdBgTable	Displays whether cell transfer delay (CTD) for the background routing table is enabled or disabled. CTD is the time interval between a cell exiting source node and entering the destination node.
cdvBgTable	Displays whether cell delay variation (CDV) for the background routing table is enabled or disabled. CDV is a component of cell transfer delay, and is a quality of service (QoS) delay parameter associated with CBR and VBR service.

Displaying the SVCC RCC Timer

Enter the **dsppnni-svcc-rcc-timer** command to display SVCC-based RCC variables:

```
Geneva.7.PXM.a > dsppnni-svcc-rcc-timer
```

The following example shows the report for this command.

```
Geneva.7.PXM.a > dsppnni-svcc-rcc-timer
node index: 1
   Init time..........         4     Retry time.........        30
   Calling party integrity time...        35
   Called party integrity time....        50
```

Table 6-11 shows the objects displayed for the **dsppnni-svcc-rcc-timer** command.

Table 6-11 Objects Displayed for the dsppnni-svcc-rcc-timer Command

Parameter	Description
node-index	The node index assigned to a PNNI logical node on a network. The range is from 1 to 65535.
initTime	The amount of time (in seconds) this node will delay advertising its choice of preferred an SVCC to a neighbor with a numerically lower ATM address, after determining that such an SVCC should be established. The range is from 1 to 10
retryTime	The amount of time (in seconds) this node will delay after an apparently still necessary and viable SVCC-based RCC is unexpectedly torn down, before attempting to re-establish it. The range is from 10 to 60

Table 6-11 Objects Displayed for the dsppnni-svcc-rcc-timer Command

Parameter	Description
callingIntegrityTime	The amount of time (in seconds) this node will wait for an SVCC, which it has initiated establishment of as the calling party, to become fully established before giving up and tearing it down. The range is from 5 to 300
calledIntegrityTime	The amount of time (in seconds) this node will wait for an SVCC, which it has decided to accept as the called party, to become fully established before giving up and tearing it down. The range is from 10 to 300.

Displaying Routing Policy Parameters

Enter the **dsppnni-timer** command to display the routing policy parameters:

```
Geneva.7.PXM.a > dsppnni-timer
```

The following example shows the report for this command:

```
Geneva.7.PXM.a > dsppnni-timer
node index: 1
   Hello holddown(100ms)...        10     PTSE holddown(100ms)...        10
   Hello int(sec)..........        15     PTSE refresh int(sec)..      1800
   Hello inactivity factor.         5     PTSE lifetime factor...       200
   Retransmit int(sec).....         5
   AvCR proportional PM....        50     CDV PM multiplier......        25
   AvCR minimum threshold..         3     CTD PM multiplier......        50
   Peer delayed ack int(100ms)..................       10
   Logical horizontal link inactivity time(sec)..     120
```

Displaying the SVCC RCC Table

Enter the **dsppnni-svcc-rcc** command to display the PNNI SVCC RCC Table.

```
Geneva.7.PXM.a > dsppnni-svcc-rcc [node-index] [svc-index]
```

If you specify:

- Both node-index and svc-index, command displays information about an SVCC-based RCC.
- Only node-index, command displays all SVC-based RCCs attached to the svc-index node.
- Nothing, command displays all SVC-based RCCs attached to all PNNI nodes on this WAN.

```
Geneva.7.PXM.a > dsppnni-svcc-rcc

Objects Displayed (for each RCC):
``
node index - 32-bit number.
svc index - 32-bit number.
hello state - ascii string.
Down
Attempt
1wayInside
2wayInside
1wayOutside
```

```
2wayOutside
Common.
remote node id - 22-byte hex string.
remote node ATM address - 20 byte hex string.
interface index - 32-bit number.
Hello packets received - 32-bit number.
Hello packets transmitted - 32-bit number.
SVCC VPI - 32-bit number.
SVCC VCI - 32-bit number.
```

Switch Operating Procedures

This chapter describes procedures you can use to manage the Cisco MGX 8850 and Cisco MGX 8950 switches.

Managing the Configuration Files

The following sections describe how to save a switch configuration in a single zipped file, clear or erase a configuration, and restore a configuration from a file.

Saving a Configuration

After configuring your switch or after making configuration updates, it is wise to save the configuration. Restoring a saved configuration is much easier than re-entering all the commands used to configure the switch.

To save a configuration, enter the **saveallcnf** command, which saves the configuration to a file in the C:/CNF directory. The file is named using the switch name and the current date as follows:

*Name*_01_*DateTime*.zip.

The date appears in YYYYMMDD (year, month, day) format, and the time appears in HHMM (hour, minute) format. For example, if the configuration for a switch named *mgx8850a* were saved on February 29th, 2000 at 2:31pm, the file would be named C:/CNF/mgx8850a_01_200002291431.zip.

When you save a configuration, the switch saves all configuration data, including the software revision levels used by the cards in the switch. The saved configuration file does not include the boot and runtime software files. Should you need to restore a configuration, the **restoreallcnf** command restores the configuration exactly as it was when the configuration file was saved. If the boot and runtime files have been removed from the switch, they must be transferred to the switch before the restored configuration can start.

Note If you have upgraded software on the switch since the last time the configuration was saved, a configuration restore will restore the non-upgraded software versions and configuration data. The software does not allow you to save a configuration and restore it on a different revision level of the software.

You can save a configuration if both of the following are true:

- No save or restore process is currently running.
- No configuration changes are in progress.

Caution Make sure that no other users are making configuration changes when you save the configuration. The Cisco MGX 8850 and Cisco MGX 8950 switches do not check for other CLI or CWM users before saving a configuration. If other users make changes while the file is being saved, the configuration can become corrupt. If you try to restore the configuration from a corrupt file, the switch can fail and you might have to send switch cards back to the factory for reprogramming.

To save a switch configuration, use the following procedure.

Step 1 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 2 If RPM-PR cards are used in the switch, enter the **copy run start** command on each RPM-PR card to save the current configuration. For example,

```
M8850_LA.7.PXM.a > cc 9

(session redirected)

RPM-PR_LA_9>enable
Password:
RPM-PR_LA_9#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
RPM-PR_LA_9#cc 7

(session redirected)

M8850_LA.7.PXM.a >
```

This step updates the configuration files, which will be saved in Step 3.

Step 3 To save the configuration, enter the **saveallcnf** command.

```
mgx8850a.7.PXM.a > saveallcnf [-v]
```

The verbose option, **-v**, displays messages that show what the switch is doing during the save process. You do not need to see these messages, but they do give you an indication on how the save process is proceeding. If you do not enter the **-v** option, the switch does not display any status messages until the save is complete.

Step 4 Read the prompt that appears. Press **Y** if you want to continue, andthen press **Enter**.

When the save is complete, the switch prompt reappears, and the new file is stored in the C:/CNF directory.

Note The switch stores only the last two files saved with the **saveallcnf** command. This prevents the hard disk from getting full due to repetitive use of this command. If you need to save files that will be erased the next time the **saveallcnf** command is run, use an FTP client to copy them to a file server or workstation before saving the next configuration.

The following example shows what appears on the switch when the **saveallcnf** command is used without the **-v** option:

```
pop20one.7.PXM.a > saveallcnf

The 'saveallcnf' command can be time-consuming. The shelf
must not provision new circuits while this command is running.

Do not run this command unless the shelf configuration is stable
or you risk corrupting the saved configuration file.

Do you want to proceed (Yes/No)? y


saveallcnf: shelf configuration saved in C:/CNF/pop20one_01_200006151550.zip.
```

Note Cisco Systems recommends that you use an FTP client to copy the saved configuration file to a workstation. This ensures that you have a backup copy if the PXM45 Hard Drive card fails. Subsequent usage of the **saveallcnf** command will overwrite an existing older configuration file, if more than one file exists in the CNF directory.

Clearing a Configuration

There are two commands that allow you to clear the switch configuration: **clrcnf** and **clrallcnf**.

To clear switch provisioning data such as the PNNI controller, AXSM ports, and SPVC connections, enter the **clrcnf** command. This command clears all configuration except the following data:

- IP address configuration
- Node name
- Software version data for each card
- SNMP community string, contact, and location
- Date, time, time zone, and GMT offset

To clear the entire configuration, enter the **clrallcnf** command. This command clears all the provisioning data and most of the general switch configuration parameters, such as the switch name and SNMP configuration. The **clrallcnf** command clears all IP addresses except the boot IP address.

Note When 4 or more RPM-PR cards are installed in the switch, a standby PXM45 can take approximately 45 minutes to reach standby state after the **clrallcnf** is entered.

Restoring a Saved Configuration

You can restore a configuration if all of the following statements are true:

- No save or restore process is currently running.
- No configuration changes are in progress.
- The switch is not hosting any critical calls.

Caution Make sure that no other users are making configuration changes when you restore the configuration. The Cisco MGX 8850 and Cisco MGX 8950 switches do not check for other CLI or CWM users before restoring a configuration. If other users make changes while the file is being restored, the configuration can become corrupt, the switch can fail, and you might have to send switch cards back to the factory for reprogramming.

To restore a saved switch configuration, use the following procedure.

Step 1 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 2 Verify that the file from which you want to restore configuration data is located in the C:/CNF directory.

Note The C:/CNF directory is the only location from which you can restore a configuration file. If the file has been moved to another directory or stored on another system, the file must be returned to this directory before the data can be restored.

Tip Enter the **cd** command to navigate the C:/CNF directory, and then enter the **ll** command to display the directory contents. For information on transferring files to and from the switch, see Appendix A, "Downloading and Installing Software Upgrades."

Step 3 To restore a saved configuration file, enter the **restoreallcnf** command.

```
mgx8850a.7.PXM.a > restoreallcnf -f filename
```

Caution The **restoreallcnf** command resets all cards in the switch and terminates all calls passing through the switch.

Note The configuration file saved with the **saveallcnf** command does not include the boot and runtime software files in use at the time of the save. If you have removed any of these files, you need to transfer them to the switch before the switch can start the restored configuration.

Replace *filename* with the name of the saved configuration file.You do not have to enter the path to the file or the extension. For information on the location and name of the file, see the "Saving a Configuration" section.

Managing ILMI

The following sections describe how to perform the following tasks:

- Enable and disable ILMI on a port
- Display ILMI port configuration data
- Display and clear ILMI management statistics
- Delete ILMI prefixes

Enabling and Disabling ILMI on a Port

The Cisco MGX 8850 and Cisco MGX 8950 switches provide several commands that you can use to enable or disable ILMI on a port. For instructions on enabling or disabling ILMI from an AXSM card prompt, see the “Configuring ILMI on a Port” section in Chapter 6, “Provisioning AXSM Communication Links.” To enable or disable ILMI from the PXM45 prompt, use the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 To display a list of ports and view the current ILMI status of each, enter the **dsppnports** command.

To enable or disable ILMI on a port, enter the **cnfilmienable** command as follows:

```
popeye2.1.7pxm.a>cnfilmienable <portid> <no | yes>
```

Replace *portid* using the format *slot*:*bay.line*:*ifNum*. Table 7-1 describes these parameters.

Enter **yes** to enable ILMI on the port, or enter **no** to disable ILMI.

Table 7-1 Port Identification Parameters

Parameter	Description
slot	Enter the slot number for the card that hosts the port you are configuring.
bay	Replace *bay* with **1** if the line is connected to a back card in the upper bay, or replace it with **2** if the line is connected to a back card in the lower bay. Remember that the bay number is always **1** for an AXSM-1-2488.
line	Replace *line* with the number that corresponds to the back card port to which the line is connected.
ifNum	An ATM port is also called an interface. Enter a number from 1 to 60 to identify this interface. The interface number must be unique on the card to which it is assigned. Interface numbers are assigned with the **addport** command.

Step 3 To verify the ILMI status change, re-enter the **dsppnports** command.

Displaying the ILMI Port Configuration

The following procedure describes some commands you can use to view the ILMI port configuration.

Step 1 Establish a configuration session using a user name with access privileges at any level.

Step 2 To display the ILMI configuration for all ports on an AXSM card, enter the **dspilmis** command. The following example shows the **dspilmis** command report.

```
pop20two.1.AXSM.a > dspilmis

    Sig. rsrc  Ilmi  Sig  Sig Ilmi  S:Keepalive T:conPoll K:conPoll
    Port Part State  Vpi  Vci Trap  Interval    Interval  InactiveFactor
    ---- ----  ---- ---- ---- --- ------------  ---------- ----------
    1    1   Off     0    16    On          1          5          4
    2    1   Off     0    16    On          1          5          4
    3    1   Off     0    16    On          1          5          4
    4    1   Off     0    16    On          1          5          4
```

The example above shows that all ports are configured for the default ILMI values and that ILMI has not been started on any port. Table 7-2 describes each of the report columns.

Table 7-2 Column Descriptions for dspilmis and dspilmi commands

Column	Description
Sig. Port	Port or logical interface for which ILMI status appears.
rsrc Part	Resource partition assigned to the port.
Ilmi State	Configured ILMI state, which appears as either On or Off. The default ILMI state is Off, which indicates that ILMI is disabled on the port. You can enable ILMI signaling on the port by entering the **upilmi** command, which changes the state to On. Note that this column indicates whether ILMI is enabled or disabled. To see the operational state of ILMI, use the **dsppnport**, **dsppnports**, or **dsppnilmi** commands.
Sig Vpi	The VPI for the ILMI signaling VCC.
Sig Vci	The VCI for the ILMI signaling VCC.
Ilmi Trap	Indicates whether ILMI traps are enabled (On) or disabled (Off) for this port.
S:Keepalive Interval	Keep alive interval. The range is 1–65535 seconds.
T:conPoll Interval	Polling interval for T491 in the range 0–65535 seconds.
K:conPoll InactiveFactor	Polling interval K in the range 0–65535 seconds.

Step 3 To display the ILMI configuration for a single port, enter the **dspilmi** command as follows:

```
pop20one.10.AXSM.a > dspilmi <ifnum> <partitionId>
```

Replace *ifnum* with the interface number of the port, and replace *partitionID* with the partition number assigned to the port. You can view both of these numbers in the **dspilmis** command report. The following is an example report for the **dspilmi** command. Table 7-2 describes each of the columns that appear in the command report.

```
pop20one.10.AXSM.a > dspilmi 1 1

    Sig. rsrc  Ilmi  Sig  Sig Ilmi  S:Keepalive T:conPoll K:conPoll
    Port Part State  Vpi  Vci Trap  Interval    Interval  InactiveFactor
    ---- ----  ---- ---- ---- --- ------------  ---------- ----------
    1    1    On     0    16    On          1          5          4
```

Step 4 To display the operational state of ILMI on all ports, enter the **dsppnports** command at the PXM45 prompt as shown in the following example:

```
pop20one.7.PXM.a > dsppnports
Summary of total connections
(p2p=point to point,p2mp=point to multipoint,SpvcD=DAX spvc,SpvcR=Routed spvc)
Type   #Svcc:   #Svpc:   #SpvcD:  #SpvpD:  #SpvcR:  #SpvpR:  #Total:
p2p:   0        0        0        0        0        0        0
p2mp:  0        0        0        0        0        0        0
                                                        Total=0
Summary of total configured SPVC endpoints
Type   #SpvcCfg: #SpvpCfg:
p2p:   0         0
p2mp:  0         0

Per-port status summary

PortId         IF status         Admin status       ILMI state       #Conns

7.35           up                up                 Undefined        0

7.36           up                up                 Undefined        0

7.37           up                up                 Undefined        0

7.38           up                up                 Undefined        0

Type <CR> to continue, Q<CR> to stop:

10:1.1:1       up                up                 UpAndNormal      0
```

The ILMI operational state is displayed as one of the following: Disable, EnableNotUp, or UpAndNormal. When ILMI is disabled on the port, the operational status is Disable. When ILMI is enabled on the local port but cannot communicate with ILMI on the remote port, the status is EnableNotUp (this happens when ILMI is disabled on the remote end). When ILMI is enabled and communicating with ILMI on the remote port, the ILMI state is UpAndNormal.

Step 5 To display ILMI configuration data for a specific port, use the **dsppnilmi** command at the PXM45 prompt as follows:

```
pop20one.7.PXM.a > dsppnilmi <portid>
```

Replace *portid* using the format *slot*:*bay.line*:*ifNum*. Table 7-1 describes these parameters. The following example shows the format of the **dsppnilmi** command report.

```
pop20one.7.PXM.a > dsppnilmi 10:1.1:1

Port:  10:1.1:1            Port Type:  PNNI             Side:  network
Autoconfig:  disable      UCSM: disable
Secure Link Protocol:  enable
Change of Attachment Point Procedures:  enable
Modification of Local Attributes Standard Procedure:  enable
Addressreg:  Permit All
VPI:       0                VCI:      16
Max Prefix:      16      Total Prefix:       0
Max Address:      64     Total Address:      0
Resync State:      0     Node Prefix: yes
Peer Port Id:    16848897   System_Id : 0.80.84.171.226.192
Peer Addressreg:  enable
Peer Ip Address : 0.0.0.0
Peer Interface Name : atmVirtual.01.1.1.01
ILMI Link State : UpAndNormal
ILMI Version : ilmi40

INFO:  No Prefix registered
```

Displaying and Clearing ILMI Management Statistics

The following procedure describes some commands you can use to view ILMI management statistics.

Step 1 To display ILMI management statistics for a port, enter the **dspilmicnt** command as follows:

```
pop20one.10.AXSM.a > dspilmicnt <ifnum> <partitionId>
```

Replace *ifnum* with the interface number of the port, and replace *partitionID* with the partition number assigned to the port. You can view both of these numbers in the **dspilmis** command report. The following is an example report for the **dspilmicnt** command.

```
pop20one.10.AXSM.a > dspilmicnt 1 1
If Number                : 1
Partition Id             : 1
SNMP Pdu Received        : 36914
GetRequest Received      : 18467
GetNext Request Received : 0
SetRequest Received      : 0
Trap Received            : 1
GetResponse Received     : 18446
GetResponse Transmitted  : 18467
GetRequest Transmitted   : 18446
Trap Transmitted         : 4
Unknown Type Received    : 0
ASN1 Pdu Parse Error     : 0
No Such Name Error       : 0
Pdu Too Big Error        : 0
```

Note Partition ID 1 is reserved for PNNI.

Step 2 To clear the ILMI management statistics for a port, enter the **clrilmicnt** command as follows:

```
pop20one.10.AXSM.a > clrilmicnt <ifnum> <partitionId>
```

Replace *ifnum* with the interface number of the port, and replace *partitionID* with the partition number assigned to the port. The following example shows the switch response to this command.

```
pop20one.10.AXSM.a > clrilmicnt 1 1
ilmi stats for ifNum 1, partId 1 cleared
```

Step 3 To verify that the statistics are cleared, re-enter the **dspilmicnt** command.

Deleting ILMI Prefixes

The procedure for adding ILMI prefixes is described in the "Configuring ILMI Dynamic Addressing" section in Chapter 6, "Provisioning AXSM Communication Links." The following procedure describes how to delete an ILMI address prefix from a port.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 To view the ILMI prefixes assigned to a port, enter the **dspprfx** command as follows:

```
pop20one.7.PXM.a > dspprfx <portid>
```

Replace <*portid*> with the port address using the format *slot*:*bay.line*:*ifnum*. These parameters are described in Table 7-1. For example:

```
pop20one.7.PXM.a > dspprfx 10:2.2:4

INFO:  No Prefix registered
```

In the example above, no ILMI prefixes were assigned to the port, so the port will use the prefix configured for the SPVC prefix.

Step 3 To prepare for deleting an ILMI prefix, down the port to be configured with the **dnpnport** command. For example:

```
pop20one.7.PXM.a > dnpnport 10:2.2:4
```

Step 4 Use the following command to delete an ATM prefix for a port:

```
popeye2.7.PXM.a > delprfx <portid> atm-prefix
```

Replace *portid* using the format *slot*:*bay.line*:*ifNum*. Table 7-1 describes these parameters.

Replace *atm-prefix* with the 13-byte ATM address prefix in use.

Step 5 Up the port you configured with the **uppnport** command. For example,

```
pop20one.7.PXM.a > uppnport 10:2.2:4
```

Step 6 To verify the proper ATM prefix configuration for a port, re-enter the **dspprfx** command.

Determining the Software Version Number from Filenames

The following version management commands require a version number to be entered in a specific format as follows:

- **abortrev**
- **burnboot**
- **commitrev**
- **loadrev**
- **runrev**
- **setrev**

In most cases, you will find the correct firmware version numbers in the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3*. If the release notes are not available, you can use the firmware filename to determine the version number as described below.

Step 1 Establish a configuration session at any access level.

Step 2 To view the files on the switch hard drive, you can enter UNIX-like commands at the switch prompt. To change directories to the firmware directory (FW), enter the **cd** command as follows:

```
mgx8850a.7.PXM.a > cd C:/FW
```

Note Remember that UNIX directory and filenames are case sensitive.

Step 3 To list the contents of the directory, enter the **ll** command:

```
mgx8850a.7.PXM.a > ll
```

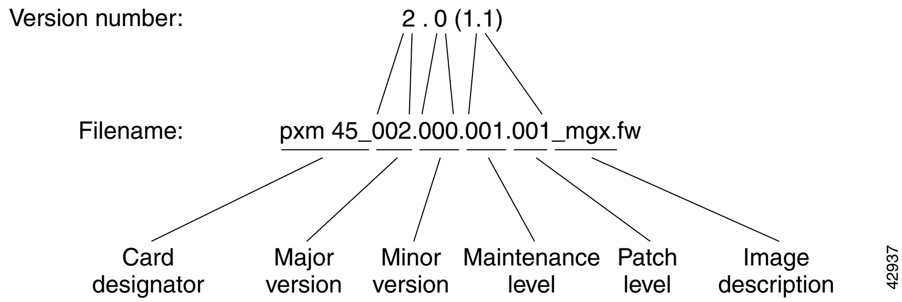
The following example shows an **ll** command display:

```
pop20one.7.PXM.a > ll
  size          date       time       name
--------       ------     ------    --------
     512    APR-19-2000  01:24:16   .                 <DIR>
     512    APR-19-2000  01:24:16   ..                <DIR>
 2248536    MAY-17-2000  15:12:16   axsm_002.000.000.000.fw
  591008    MAY-15-2000  21:37:28   axsm_002.000.000.000_bt.fw
  839392    MAY-15-2000  21:37:36   pxm45_002.000.000.000_bt.fw
 3450888    MAY-15-2000  21:37:48   pxm45_002.000.000.000_mgx.fw
 2260984    JUN-06-2000  07:18:40   axsm_002.000.001.000.fw
  592288    JUN-06-2000  07:09:02   axsm_002.000.001.000_bt.fw
  844720    JUN-06-2000  07:09:26   pxm45_002.000.001.000_bt.fw
 3481816    JUN-06-2000  07:11:00   pxm45_002.000.001.000_mgx.fw

In the file system :
    total space :  819200 K bytes
    free  space :  786279 K bytes
```

Figure 7-1 shows the information contained in filenames for released software.

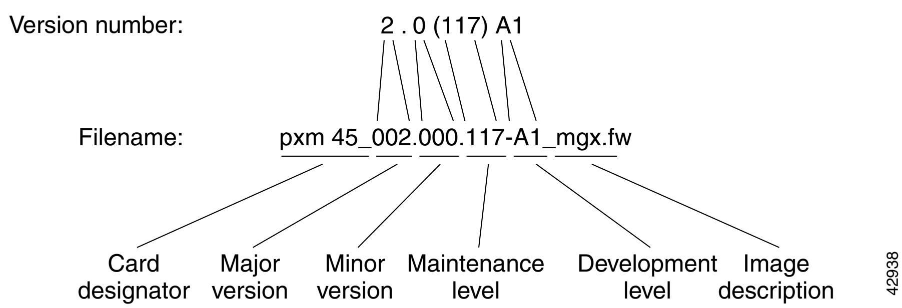
Figure 7-1 Filename Format for Released Software



Filenames that include "_mgx" are for runtime PXM45 firmware, and filenames that include "_bt" are for boot firmware. AXSM runtime firmware images do not have an image description after the version number. When you first receive the switch from Cisco, there will be single versions of each file. If you download updates to any files, there will be multiple versions of those files.

Figure 7-2 shows the information contained in filenames for prereleased firmware. If you are evaluating nonreleased firmware, the filename format shows that the firmware is prereleased and indicates the development level of the prerelease firmware.

Figure 7-2 Filename Format for Prereleased Firmware



Step 4 Translate the filenames to version numbers, and write the numbers down so you can set the revision levels for the software.

Write the version number down in the format required by the revision management commands. The following example shows the required format. If you are logged in as a user with SERVICE_GP access privileges, you can display this example by entering any of the revision management commands without parameters.

```
pop20one.7.PXM.a > runrev
ERR: Syntax: runrev <slot> <revision>
           revision - revision number. E.g.,
                      2.0(1)
                      2.0(1.248)
                      2.0(0)B1 or 2.0(0)B2
                      2.0(0)A1 or 2.0(0)A2
                      2.0(0)I1 or 2.0(0)I2
                      2.0(0)D
```

The first example above, 2.0(1), is for released firmware version 2.0, maintenance release 1. The second example, 2.0(1.248), is for patch 248 to version 2.0, maintenance release 1. The other examples are for prerelease firmware. Prerelease firmware does not include patches; the maintenance release number is increased for each software change.

Table 7-3 shows some example filenames and the correct version numbers to use with the revision management commands.

Table 7-3 Determining Firmware Version Numbers from Filenames

Filename	Version Number for Revision Management Commands
pxm45_002.000.000.000_bt.fw	2.0(0)
pxm45_002.000.001.000_bt.fw	2.0(1)
axsm_002.000.001.001.fw	2.0(1.1)
pxm45_002.000.001-D_mgx.fw	2.0(1)D
pxm45_002.000.014-A1_bt.fw	2.0(14)A1
axsm_002.000.016-D.fw	2.0(16)D

Displaying Software Revisions in Use

The following sections describe:

- Displaying Software Revisions for All Cards
- Displaying Software Revisions for a Single Card

Displaying Software Revisions for All Cards

To display the boot and runtime software version in use on every card in the switch, enter the **dsprevs** command as shown in the following example:

```
pop20one.7.PXM.a > dsprevs
pop20one                         System Rev: 02.00   Jan. 24, 2001 18:32:57 PST
MGX8850                                              Node Alarm: NONE
Physical  Logical   Inserted       Cur Sw              Boot FW
Slot      Slot      Card           Revision            Revision
--------  -------   --------       --------            --------

01        01        AXSM_4OC12     2.0(12)             2.0(12)
02        02        AXSM_4OC12     2.0(12)             2.0(12)
03        03        ---            ---                 ---
04        04        ---            ---                 ---
05        05        ---            ---                 ---
06        06        ---            ---                 ---
07        07        PXM45          2.0(12)             2.0(12)
08        07        PXM45          2.0(12)             2.0(12)
09        09        ---            ---                 ---
10        10        ---            ---                 ---
11        11        ---            ---                 ---
12        12        ---            ---                 ---
13        13        ---            ---                 ---
14        14        ---            ---                 ---
15        15        ---            ---                 ---
16        16        ---            ---                 ---
Type <CR> to continue, Q<CR> to stop:
```

To display the upgrades status of the runtime software on all switch cards, enter the **dsprevs -status** command as shown in the following example:

```
pop20one.7.PXM.a > dsprevs -status
pop20one                         System Rev: 02.00   Jan. 24, 2001 18:37:16 PST
MGX8850                                              Node Alarm: NONE
Phy. Log. Cur Sw          Prim Sw          Sec Sw           Rev Chg
Slot Slot Revision        Revision         Revision         Status
---- ---- --------        --------         --------         -------

01   01   2.0(12)         2.0(12)          2.0(12)          ---
02   02   2.0(12)         2.0(12)          2.0(12)          ---
03   03   ---             ---              ---              ---
04   04   ---             ---              ---              ---
05   05   ---             ---              ---              ---
06   06   ---             ---              ---              ---
07   07   2.0(12)         2.0(12)          2.0(12)          ---
08   07   2.0(12)         2.0(12)          2.0(12)          ---
09   09   ---             ---              ---              ---
10   10   ---             ---              ---              ---
11   11   ---             ---              ---              ---
12   12   ---             ---              ---              ---
13   13   ---             ---              ---              ---
14   14   ---             ---              ---              ---
15   15   ---             ---              ---              ---
16   16   ---             ---              ---              ---

Type <CR> to continue, Q<CR> to stop:
```

Displaying Software Revisions for a Single Card

To display the boot and runtime software revisions in use on a single card, enter the **dspcd** <*slot*> command as shown in the following example:

```
pop20one.7.PXM.a > dspcd 7
pop20one                         System Rev: 02.00   Jan. 24, 2001 18:39:00 PST
MGX8850                                              Node Alarm: NONE
Slot Number    7    Redundant Slot:  8

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      PXM45               UI Stratum3         PXM HardDiskDrive
Reserved Card:      PXM45               UI Stratum3         PXM HardDiskDrive
State:              Active              Active              Active
Serial Number:      SAK03260058         SAK0332009P         SAK0325007Q
Prim SW Rev:        2.0(12)             ---                 ---
Sec SW Rev:         2.0(12)             ---                 ---
Cur SW Rev:         2.0(12)             ---                 ---
Boot FW Rev:        2.0(12)             ---                 ---
800-level Rev:      06                  04                  03
Orderable Part#:    800-05306-01        800-05787-01        800-05052-02
CLEI Code:                        h
Reset Reason:       On Power up
Card Alarm:         NONE
Failed Reason:      None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:
```

Managing Redundant Cards

The Cisco MGX 8850 and Cisco MGX 8950 switches support redundancy between two cards of the same type. For PXM45 cards, this redundancy is preconfigured on the switch. To establish redundancy between two AXSM cards, enter the **addred** command as described in the "Establishing Redundancy Between Two AXSM Cards" section in Chapter 3, "Preparing AXSM Cards and Lines for Communication."

The following sections describe how to

- Display the redundancy configuration
- Switch operation from one card to the other
- Remove the redundancy between two AXSM cards

Displaying Redundancy Status

To display the redundancy configuration for the switch, use the following procedure.

Step 1 Establish a configuration session at any access level.

Step 2 To view the redundancy status, enter the following command:

```
mgx8850a.7.PXM.a > dspred
```

After you enter the command, the switch displays a report similar to the following:

```
pop2one.7.PXM.a > dspred
pop2one                      System Rev: 02.00   Feb. 23, 2000 10:59:10 PST
MGX8850                                          Shelf Alarm: NONE
Primary  Primary  Primary  Secondary  Secondary  Secondary  Redundancy
SlotNum   Type     State    SlotNum     Type       State       Type
-------  -------  -------  ---------  ---------  ---------  ----------
  7      PXM45     Active      8        PXM45      Empty Resvd  1-1
```

Switching Between Redundant PXM Cards

When the switch has two PXM45 cards running in active and standby mode, enter the **swtichcc** command to swap the roles of the two cards. Typically, you use this command to switch roles so you can upgrade the hardware or software on one of the cards.

Note The **switchcc** command is executed only when all cards are operating in active or standby roles. For example, if the non-active PXM45 is not in standby state, or if an AXSM card is being upgraded, the **switchcc** command is not executed.

To switch operation from one redundant PXM card to another, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Check the status of the active and standby cards by entering the **dspcds** command.

The **dspcds** command should list one card as active and one card as standby. If the cards are not in their proper states, the switchover cannot take place.

Step 3 To switch cards, enter the **switchcc** command after the switch prompt.

```
mgx8850a.7.PXM.a > switchcc
```

Switching Between Redundant AXSM Cards

To switch operation from an active redundant AXSM card to the standby card, use the following procedure.

Step 1 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 2 Check the status of the active and standby cards by entering the **dspcds** command.

The **dspcds** command should list one card as active and one card as standby. If the cards are not in their proper states, the switchover cannot take place.

Step 3 To switch cards, enter the **switchredcd** command after the switch prompt.

```
mgx8850a.7.PXM.a > switchredcd <fromSlot> <toSlot>
```

Replace <*fromSlot*> with the card number of the active card, and replace <*toSlot*> with the card number to which you want to switch control.

Switching Between Redundant RPM-PR Cards

To switch operation from an active RPM-PR card to the standby card, use the following procedure.

Step 1 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 2 Check the status of the active and standby cards by entering the **dspcds** command.

The **dspcds** command should list one card as active and one card as standby. If the cards are not in their proper states, the switchover cannot take place.

Step 3 To switch cards, enter the following command after the switch prompt:

```
mgx8850a.7.PXM.a > softswitch <fromSlot> <toSlot>
```

Replace <*fromSlot*> with the card number of the active card, and replace <*toSlot*> with the card number to which you want to switch control.

Removing Redundancy Between Two Cards

To remove the redundant relationship between two AXSM cards, use the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1_GP privileges or higher.

Step 2 To remove card redundancy, enter the following command after the switch prompt:

```
mgx8850a.7.PXM.a > delred <primarySlot>
```

Replace *primarySlot* with the number of the primary card. You can view the primary and secondary status of cards by entering the **dspred** command.

Managing Redundant APS Lines

The Cisco MGX 8850 and Cisco MGX 8950 switches support APS line redundancy. To establish redundancy between two lines, enter the **addapsln** command as described in the "Establishing Redundancy Between Two Lines with APS" section in Chapter 3, "Preparing AXSM Cards and Lines for Communication."

The following sections describe how to

- Prepare for Intercard APS
- Display APS line information
- Configure APS lines
- Switch APS lines
- Remove the redundancy between two lines

Prepare for Intercard APS

The following components are required for intercard APS:

- two front cards.
- two back cards for every bay hosting APS lines. All lines on cards used for intercard APS must operate in APS pairs or use Y cables.
- an APS connector installed between the two back cards for every bay hosting APS lines.

Enter the **dspapsbkplane** command on both the standby and active card to verify that the APS connector is plugged in properly. The following example shows the results displayed by the **dspapsbkplane** command when the APS connector is in place:

```
M8850_NY.1.AXSM.a > dspapsbkplane

Line-ID   Primary Card Signal Status       Secondary Card Signal Status
                    Slot #1                                  Slot #2
  1.1               PRESENT                                  PRESENT
  1.2               PRESENT                                  ABSENT
  2.1               PRESENT                                  ABSENT
  2.2               PRESENT                                  ABSENT

Remote Front Card : PRESENT
```

```
Top Back Card     : ENGAGED
Bottom Back Card  : ENGAGED
```

The following example shows the results displayed by the **dspapsbkplane** command when the APS connector is not place:

```
M8850_LA.1.AXSM.a > dspapsbkplane

Line-ID   Primary Card Signal Status       Secondary Card Signal Status
                    Slot #1                              Slot #2
  1.1               PRESENT                              ABSENT
  1.2               ABSENT                               ABSENT
  2.1               PRESENT                              ABSENT
  2.2               ABSENT                               ABSENT

Remote Front Card : ABSENT
Top Back Card     : ENGAGED
Bottom Back Card  : NOT-ENGAGED
```

Note The **dspapsbkplane** command should be used only when the standby card is in the Ready state. When the standby card is booting or fails, intercard APS cannot work properly, and the **dspapsbkplane** command displays "NOT ENGAGED."

If the **dspapsbkplane** command displays the message "APS Line Pair does not exist," suspect that the APS is not configured on a line.

If the **dspapsbkplane** command shows different values for each of the two cards, suspect that the APS connector is seated properly on one card but not on the other.

The APS connector status is the same for all lines in a single bay because the APS connector interconnects two back cards within the same bay. You need to enter the **dspapsbkplane** command only once to display the APS connector status for both upper and lower bays.

Enter the **dspapslns** command to verify APS configuration. If the working and protection lines show OK, both lines are receiving signals from the remote note.

Configuring Intercard APS Lines

In AXSM and AXSM/B intercard APS, either front card can be active, and can be connected to either APS line through the APS connector joining the two back cards. The following process describes how intercard APS communication works:

1. The signal leaves the front card at the remote end of the line.
2. The signal passes through the APS connector and both back card transmit ports at the remote end of the line.
3. The signal travels through both communication lines to the receive ports on both back cards at the local end.
4. The active front card processes the signal that is received on the active line.
5. The standby card monitors only the status of the standby line.
6. If necessary, the signal passes through the APS connector to the front card.

Note The front card monitors only one of the receive lines.

Figure 7-3 shows an example of how this process operates in a standard APS configuration, where the primary card monitors the working line and the secondary card monitors the protection line.

Figure 7-4 shows an example of how the APS communication process operates in a crossed APS configuration, where the secondary card monitors the working line that is attached to the primary card, and the primary card monitors the protection line that is connected to the secondary card.

Figure 7-3 Standard APS Configuration

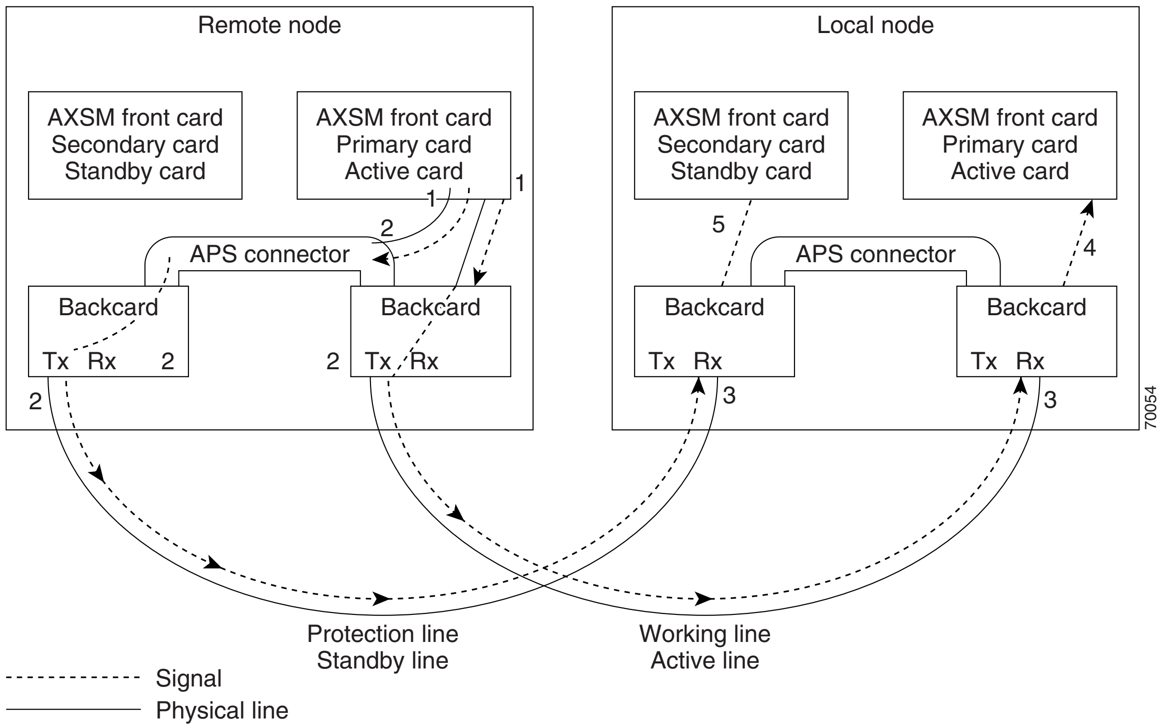
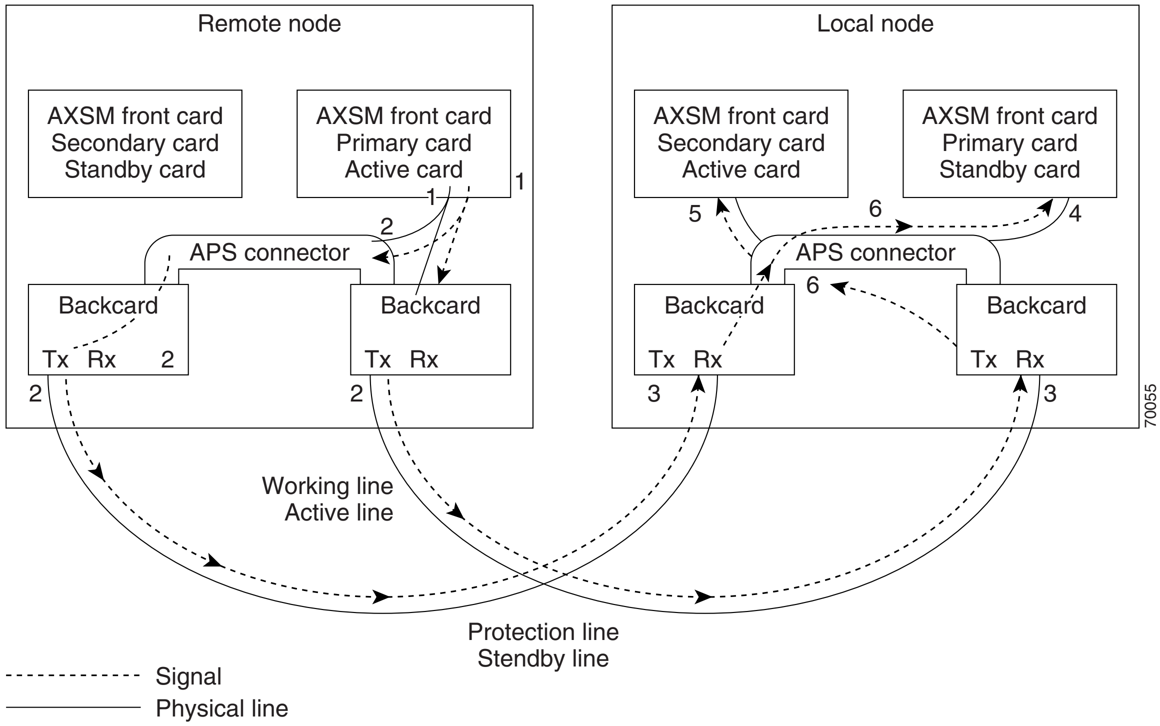


Figure 7-4 Crossed APS Configuration



Line failures are always detected at the receive end of the line. This is where a switchover occurs when a failure is detected. Two different types of switchovers can occur, depending on whether the APS was configured as unidirectional or bidirectional in the **cnfapsln** command:

- When a failure occurs on a line configured for unidirectional switching, the switch changes lines at the receive end only. A switchover is not necessary at the transmit end because the transmitting back cards send signals on both lines in the 1 +1 APS configuration.
- When a failure occurs on a line configured for bidirectional switching, a switchover occurs at both ends of the line.

If the status of the standby line is good, a switchover from the failed active line to the standby is automatic.

Enter the **cnfapsln** command to enable an automatic switchover back to the working line after it recovers from a failure, as shown in the following example:

```
M8850_LA.1.AXSM.a > cnfapsln -w 1.1.1 -rv 2
```

Table 7-4 describes the configurable parameters for the **cnfapsln** command.

Table 7-4 cnfapsln Command Parameters

Parameter	Description
-w <*working line*>	Slot number, bay number, and line number of the active line to configure, in the format: `slot.bay.line` Example: `-w 1.1.1`
-sf <*signal fault ber*>	A number between 3 and 5 indicating the Signal Fault bit error rate (BER), in powers of ten: • 3 = 10^{-3} • 4 = 10^{-4} • 5 = 10^{-5} Example: `-sf 3`
-sd <*SignalDegradeBER*>	A power if 10 in the range 5-9 that indicates the Signal Degrade bit error rate (BER): • 5 = 10^{-5} • 6 = 10^{-6} • 7 = 10-7 • 8 = 10^{-8} • 9 = 10^{-9} Example: `-sd 5`
-wtr <*Wait To Restore*>	The number of minutes to wait after the failed working line has recovered, before switching back to the working line. The range is 5-12. Example: `-wtr 5`

Table 7-4 cnfapsln Command Parameters (continued)

Parameter	Description
-w <*working line*>	Slot number, bay number, and line number of the active line to configure, in the format: `slot.bay.line` Example: `-w 1.1.1`
-dr <*direction*>	Determines whether the line is unidirectional or bidirectional. • 1 = Unidirectional. The line switch occurs at the receive end of the line. • 2 = Bidirectional. The line switch occurs at both ends of the line. **Note** This optional parameter is not shown in the above example because you do not need to set it for a revertive line. Example: `-dr 2`
-rv <*revertive*>	Determines whether the line is revertive or non-revertive. • 1 = Non-revertive. You must manually switch back to a recovered working line. • 2 = Revertive. APS automatically switches back to a recovered working line after the number of minutes set in the -wtr parameter. Example: `-rv 1`

If you want to manually switch from one line to another, enter the **switchapsln** <*bay*> <*line*> <*switchOption*> command, as shown in the following example:

```
M8850_LA.1.AXSM.a > switchapsln 1 1 6
Manual line switch from protection to working succeeded on line 1.1.1
```

Table 7-5 describes the configurable parameters for the **switchapsln** command.

Table 7-5 switchapsln Command Parameters

Parameter	Description
bay	The working bay number to switch.
line	The working line number to switch.

Table 7-5 switchapsln Command Parameters (continued)

Parameter	Description
switchOption	The method of performing the switchover. • 1 = Clear previous user switchover requests. Return to working line only if the mode is revertive. • 2 = Lockout of protection. Prevents specified APS pair from being switched over to the protection line. If the protection line is already active, the switchover is made back to the working line. • 3 = Forced working to protection line switchover. If the working line is active, the switchover is made to the protection line unless the protection line is locked out or in the SF condition, or if a forced switchover is already in effect. • 4 = Forced protection to working line switchover. If the protection line is active, the switch is made to the working line unless a request of equal or higher priority is in effect. This option has the same priority as option 3 (forced working to protection line switchover). Therefore, if a forced working to protection line switchover is in effect, it must be cleared before this option (forced protection to working line switchover) can succeed. • 5 = Manual switchover from working to protection line unless a request of equal or higher priority is in effect. • 6 = Manual switchover from protection to working line. This option is only available in the 1+1 APS architecture.
service switch	This is an optional parameter. When set to 1, this field causes all APS lines to switch to their protected lines.

Enter the **dspapslns** command to verify that the active line switched over from the protection line to the working line, as shown in the following example:

```
M8850_LA.1.AXSM.a > dspapslns
Working Prot.  Conf  Oper    Active  WLine PLine WTR   Revt Conf Oper LastUser
Index   Index  Arch  Arch    Line    State State (min)      Dir  Dir  SwitchReq
------- -----  ----  -----   ------  ----- ----- ----- ---- ---- ---- ----------
  1.1.1  2.1.1 1+1    1+1    working    OK    OK     5  Yes   bi   bi ManualP->W
```

Displaying APS Line Information

To display the APS line redundancy configuration for an AXSM card, enter the **dspapsln** command as described below.

Step 1 Establish a configuration session at any access level.

Step 2 To view the redundancy status, enter the following command after the switch prompt:

```
pop20one.9.AXSM.a > dspapsln
```

After you enter the command, the switch displays a report similar to the following:

```
pop20one.9.AXSM.a > dspapsln
Working Prot.  Conf    Oper    Active SFBer SDBer WTR   Revt Dir LastUser
Index   Index  Arch    Arch    Line   10^-n 10^-n (min)          SwitchReq
------- -----  ----    -----   ------ ----- ----- ----- ---- --- ----------
  9.1.1  9.1.2  1+1     1+1    working     3     5    5   No uni No Request
  9.2.1  9.2.2  1+1     1+1    working     3     5    5   No uni No Request
```

Modifying APS Lines

To change the configuration for an APS line, enter the **cnfapsln** command as described in the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1_GP privileges or higher.

Step 2 Enter the **cnfapsln** command as follows:

```
pop20one.9.AXSM.a > cnfapsln -w <workingIndex> -sf <SignalFaultBER>
-sd <SignalDegradeBER> -wtr <Wait To Restore> -dr <direction> -rv <revertive>
```

Select the working line to configure by replacing <*workingIndex*> with the with the location of the working line using the format slot.bay.line. For example, to specify the line on card 9, bay 1, line 2, enter **9.1.2**.

Table 7-6 describes the **cnfapsln** command options.

Table 7-6 Options for cnfapsln Command

Option	Description
-sf	The signal failure bit error rate (BER) threshold. Replace <*SignalFaultBER*> with a number in the range of 3 to 5. 5 = signal failure BER threshold = 10 ^^ -5.
-sd	The signal degrade BER threshold. Replace <*SignalDegradeBER*> with a number in the range of 5 to 9. 5 = signal degrade BER threshold = 10 ^^ -5.

Table 7-6 Options for cnfapsln Command (continued)

Option	Description
-wtr	The number of minutes to wait before attempting to switch back to the working line. Replace <*Wait To Restore*> with a number in the range of 1 to 12 (minutes). **Note** This option is applicable only when the **-rv** option is set to 2, enabling revertive operation.
-dr	The direction option, which specifies the communication paths to be switched when a failure occurs. The options are unidirectional or bidirectional. When the unidirectional option is selected, only the affected path, either transmit or receive, is switched. When the bidirectional option is selected, both paths are switched. To set this option, replace the <*direction*> variable with **1** for unidirectional operation or **2** for bidirectional operation.
-rv	The revertive option, which defines how the switch should operate when a failed line recovers. The options are revertive and nonrevertive. When the **-rv** option is configured for revertive operation and the working line recovers, the switch will switch back to the working line after the period specified by the **-wtr** option. If the line is configured for nonrevertive operation, a failure on the working line will cause the switch to use the protect line until a manual switchover is initiated as described in the "Switching APS Lines" section. To set this option, replace the <*revertive*> variable with **1** for non-revertive operation or **2** for revertive operation.

Switching APS Lines

To switch between two APS lines, enter the **switchapsln** command as described in the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1_GP privileges or higher.

Step 2 Enter the **switchapsln** command as follows:

```
pop20one.9.AXSM.a > switchapsln <bay> <line> <switchOption> <serviceSwitch>
```

Select the working line to switch by replacing <*bay*> with the bay number of the working line, and replacing <*line*> with the line number for the working line.

Table 7-7 describes the other options you can use with this command.

Table 7-7 Options for switchapsln Command

Option	Value	Description
switchOption	1	Clear.
	2	Lockout of protection.
	3	Forced working->protection.
	4	Forced protection->working.
	5	Manual working->protection.
	6	Manual protection->working; applies only to 1+1 mode.
serviceSwitch	0 or 1	0 switches specified line. 1 switches all lines.

Removing APS Redundancy Between Two Lines

To remove the redundant APS line relationship between two lines, enter the **delapsln** command as described in the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1_GP privileges or higher.

Step 2 To remove redundancy between the two lines, enter the following command after the switch prompt:

```
mgx8850a.7.PXM.a > delapsln <workingIndex>
```

Select the working line to delete by replacing <*workingIndex*> with the location of the working line using the format slot.bay.line. In the following example, the **delapsln** command removes the APS redundancy between the working line at Card 9, Bay 2, Line 1 and the protection line associated with it.

```
pop20one.9.AXSM.a > delapsln 9.2.1
```

Troubleshooting APS Lines

Port lights on AXSM and AXSM/B front cards indicate the receive status of APS lines. The active front card always displays the status of the active line. The standby card always displays the status of the inactive line. If only one APS line fails, the line failure LED is always displayed on the standby front card.

Caution When the active front card and the active line are in different slots and the inactive line has failed, it is easy to incorrectly identify the failed line as the line in the standby slot. To avoid disrupting traffic through the active line, verify which physical line is at fault before disconnecting the suspect line.

If the active line fails and the standby line is not available, the switch reports a critical alarm.

If the active line fails and the standby line takes over, the former standby line becomes the new active line, and the switch reports a major alarm.

If an AXSM front card fails, APS communication between the redundant front cards fails. This can result in one of the following situations:

- If both APS lines were working before the failure, an APS line failure causes a switchover to the protection line
- If either APS line failed prior to a front card failure, a failure on the active line does not cause a switchover to the other line. Because the standby front card failed, it cannot monitor the standby line and report when the line has recovered. This means that the active card cannot use the standby line until the standby front card is replaced and the line problem corrected.

Use the following procedure to troubleshoot APS lines.

Step 1 Enter the **dsplns** command to determine if the line in alarm is an APS line. The **dsplns** command shows which lines are enabled for APS.

```
M8850_LA.1.AXSM.a > dsplns
                                              Medium Medium
      Sonet  Line      Line     Line    Frame  Line   Line     Alarm   APS
      Line  State      Type     Lpbk   Scramble Coding Type     State   Enabled
      ----- ----- ------------ ------ -------- ------ -------  -----   --------
       1.1     Up sonetSts12c NoLoop   Enable  Other ShortSMF    Clear Enable
       1.2     Up sonetSts12c NoLoop   Enable  Other ShortSMF    Clear Disable
       2.1     Up sonetSts12c NoLoop   Enable  Other ShortSMF    Clear Disable
       2.2     Up sonetSts12c NoLoop   Enable  Other ShortSMF    Clear Disable
```

If the line in alarm is an APS line, and has always functioned properly as an APS line, proceed to Step 2.

If the line in alarm has never functioned properly as an APS line, verify that the following are true:

- redundant front and back cards are in the appropriate bays and are installed at both ends of the line.
- cable is properly connected to both ends of the line.
- enter the **dspapsbkplane** command to verify that the APS connector is installed properly at both ends of the line.

Step 2 Enter the **dspapslns** command at both ends of the communication line to determine whether one or both lines in an APS pair are bad. Use Table 7-8 to help you determine which APS line is not functioning properly.

Table 7-8 Troubleshooting APS Line Problems Using the dspaps Command

Active Line	Working Line	Protection Line	Working Line LED	Protection Line LED	Description
Working	OK	OK	Green	Green	Active card is receiving signal on working and protection lines. This does not guarantee that transmit lines are functioning properly. You must view the status on remote switch.
Protection	SF	OK	Green	Red	Active card is receiving signal on the protection line. No signal received on the working line.
Working	OK	SF	Green	Red	Active card is receiving signal on the working line. No signal received on the protection line.
Working	SF	SF	Red	Red	Active card is not receiving signal from either line. The working line was the last line to work.

Table 7-8 Troubleshooting APS Line Problems Using the dspaps Command (continued)

Active Line	Working Line	Protection Line	Working Line LED	Protection Line LED	Description
Protection	SF	SF	Red	Red	Active card is not receiving signal from either line. The protection line was the last line to work.
Working	UNAVAIL	UNAVAIL	—	—	The card set is not complete. One or more cards have failed or been removed. See Table 7-9 to troubleshoot card errors.

If one or both lines appear to be bad, determine whether the working or protection line is in alarm. Troubleshoot and correct the standby line first. Replace the components along the signal path until the problem is resolved.

- If the **dspapslns** command at either end of the line indicates a front or back card problem, resolve that problem first. (See Table 7-9 to card problems).
- If the **dspapslns** command shows a signal failure on the standby line, replace that line.
- If the standby line is still down, replace the cards along the signal path.

Table 7-9 Troubleshooting Card Problems

APS Line Failure	Possible Cause
All lines in upper and lower bays.	Suspect a bad or removed front card. If both front cards are good, both back cards may be bad.
All lines in upper bay only. Lower bay APS lines ok.	Suspect bad upper bay back card.
All lines in lower bay only. Upper bay APS lines ok.	Suspect bad lower bay back card.

Managing Network Clock Sources

The following sections describe how to do the following tasks:

- View the configured clock sources
- Reconfigure network clock sources
- Delete clock sources
- Restore clock the clock source after failure

Synchronizing Time of Day Clocks

Clock synchronization is valuable for network clients with applications which need to have a reliable and accurate TOD. MGX switches use SNTP to synchronize Time of Day (TOD) clocks between a client and a server. An SNTP client can be configured to synchronize with one primary SNTP server and up to three secondary SNTP servers, and an SNTP server can support up to 200 clients.

In an SNTP server/client configuration, the SNTP client periodically receives TOD requests from the primary server. If the primary server is not available for some reason, the SNTP client switches over the next available secondary server for TOD information until the primary server comes back up.

An SNTP server can reside on an active PXM in an MGX and in and SES switch. The primary server can reside on an MGX switch, and the secondary server or servers reside on the SES, or vice-versa. For instructions on setting up an SNTP server on an SES switch, refer to the *SES PNNI Controller Software Configuration Guide, Release 3.0*.

To set synchronize network clocks, you need to perform the following task in order:

1. Set up a primary server for the network client.
2. Set up a secondary server (or several secondary servers), which serves as a backup server if the SNTP client cannot reach the primary server.
3. Configure the network client.

Note To synchronize the primary and secondary servers, the SNTP client must be enabled on the node or nodes on which the servers are running.

Use the following procedure to set up TOD synchronization in your network.

Note SNTP clients and servers run only on active PXM cards.

Step 1 Select a primary server that is able to provide reliable TOD information to the network.

Step 2 At the PXM45 prompt, enter the **cnfsntp *-server on -stratum*** <*stratum level* > command to enable the server and configure the stratum level. Replace <*stratum level* > with the stratum level for the server.

```
M8850_LA.8.PXM.a > cnfsntp -server on -stratum 1
```

Step 3 Select a secondary server and log in to the active PXM45 card on the switch where your secondary server will reside.

Step 4 At the PXM45 prompt, enter the **addsntprmtsvr** <*options*> command to set up the connection to the primary server.

```
M8850_LA.8.PXM.a > addsntprmtsvr <server IP address>  -version <version> -primary yes
```

Replace <*server IP address*> with the primary servers IP address.

Table 7-10 describes the **addsntprmtsvr** command parameters.

Table 7-10 addsntprmtsvr Command Parameters

Parameter	Description
server IP address	Server’s IP Address in dotted decimal format.
version	Sets the SNTP version number.
primary	Determines whether the server is primary or secondary. Enter **yes** for primary, or **no** for secondary. The default is **no**.

The following example shows the **addsntprmtsvr** command:

```
M8850_LA.8.PXM.a > addsntprmtsvr 172.29.52.88 -version 4 -primary yes

M8850_LA.8.PXM.a >
```

Step 5 Enter the **addsntprmtsvr** <*options*> command again to configure the secondary server.

```
M8850_LA.8.PXM.a > addsntprmtsvr <server IP address> -version {version} -primary no
```

This time, replace <*server IP address*> with the primary server's IP address.

Note You do not include the -primary option with the command because the default setting for this parameter is *no*. However, if you do include the -primary option in the command, be sure to set it to *no*.

In the following example, the user sets up a secondary server on the IP address 172.29.52.89.

```
M8850_LA.8.PXM.a > addsntprmtsvr 172.29.52.89 -version 4 -primary no
```

Step 6 Enter the **cnfsntp** command to configure SNTP sever parameters.

M8850_LA.8.PXM.a > **cnfsntp** {[-polling insecond] [-waiting insecond] [-rb insecond] [-client on|off] [-server on|off] [-stratum 0-15]}

Table 7-11 describes the **cnfsntp** command parameters.

Table 7-11 cnfsntp Command Parameters

Parameter	Description
-polling	Polling timer on the SNTP client. When this timer expires, the client requests TOD from the server. The time range is from 64 to 10245 seconds. (default = 64 seconds)
-waiting	Waiting timer that automatically sets when the TOD request is sent to the server. If this timer expires three times, the client switches over to the first available secondary server for TOD. (default = 5 seconds)
-rb	When a client switches over to the secondary server for TOD requests, the rollback timer takes affect and continues polling the primary server for TOD each time the rollback timer expires. The rollback timer continues polling the primary server until it comes back up. (default = 1024)
-client	Toggles the SNTP client on or off.
-server	Toggles the Primary SNTP server on or off.
-stratum	Stratum of the SNTP client. The default is 0.

Modifying SNTP Servers

Enter the **cnfsntprmtsvr** command to modify the existing SNTP server, as shown in the following example:

```
M8850_LA.8.PXM.a > cnfsntprmtsvr <server IP address>  -version <version> -primary yes
```

Table 7-12 describes the **cnfsntprmtsvr** command parameters.

Table 7-12 cnfsntprmtsvr Command Parameters

Parameter	Description
server IP address	Server's IP Address in dotted decimal format.
version	Sets the SNTP version number.
primary	Determines whether the server is primary or secondary. Enter **yes** for primary, or **no** for secondary. The default is **no**.

The following example shows the **cnfsntprmtsvr** command:

```
M8850_LA.8.PXM.a > cnfsntprmtsvr 172.29.52.88 -version 4 -primary yes
```

Modifying SNTP Clients

Enter the **cnfsntp** <*options*> command to modify SNTP client configuration, as shown in the following example.

```
M8850_LA.8.PXM.a > cnfsntp 172.29.52.88 -version 4 -primary yes
```

Table 7-11 describes the **cnfsntp** command parameters.

Deleting an Existing SNTP Server

Enter the **delsntprmtsvr** <*IP_address*> command at the active PXM45 prompt to delete a specific SNTP server. Replace <*IP_address*> with the IP address of the server you want to delete.

```
M8850_LA.8.PXM.a > delsntprmtsvr 172.29.52.88
```

Enter the **delsntprmtsvr** *all* command to delete all SNTP servers on the network, as shown in the following example:

```
M8850_LA.8.PXM.a > delsntprmtsvr all
```

Displaying an SNTP Server

Enter the **dspsntprmtsvr** command at the active PXM45 prompt to display a specific SNTP server.

```
M8850_NY.8.PXM.a > dspsntprmtsvr 172.29.52.88
```

Enter the **dspsntprmtsvr** `all` command at the active PXM45 prompt to display a list of all existing SNTP servers in the network.

```
M8850_NY.8.PXM.a > dspsntprmtsvr all
```

Displaying the Current SNTP Configuration

Enter the **dspsntp** command at the active PXM45 prompt on the server to display the client requesting the TOD information from the current server.

```
M8850_NY.8.PXM.a > dspsntp

client: yes
server: yes

polling: 64
waiting: 5
rollback: 1024
stratum(default): 3
stratum(current): 3
sync: no
```

Table 7-13 shows the objects displayed for the **dspsntp** command.

Table 7-13 Objects Displayed for dspsntp Command

Parameter	Description
client:	Shows whether the SNTP client is turned “on” or “off”.
server:	Shows whether the SNTP server is turned “on” or “off”.
polling:	Shows the current number of seconds set on the polling timer. When this timer expires, the client requests TOD from the server.
waiting:	Shows the current number of seconds set on the waiting timer. If this timer expires three times, the client switches over to the first available secondary server for TOD. (default = 5 seconds)
rollback:	When a client switches over to the secondary server for TOD requests, the rollback timer takes affect and continues polling the primary server for TOD each time the rollback timer expires. The rollback timer continues polling the primary server until it comes back up. `(default = 1024`
stratum (default):	Shows the default stratum level.
stratum (current):	Shows the current settings for the stratum level.
sync:	Shows whether the SNTP client and server are in sync.

Managing NCDP Clock Sources

The following section provide commands and procedures for managing NCDP clock source configuration.

Note By default, NCDP is disabled on all Release 3 nodes and all NNI ports. To enable NCDP and disable any manual configuration on your node, use the **cnfncdp** command. You can return to your original manual configuration at any time by disabling NCDP through the **cnfncdp** command.

Configuring an NCDP Clock Source

When you enable NCDP through the **cnfncdp** command, NCDP automatically selects the root clock source based on the following criteria:

- Priority (should be sufficient to find the root)
- Stratum level (should be sufficient as a tie-breaker)
- Clock source reference
- ATM address of the switch

You can manipulate these criteria and specify a clock source through the c**nfncdpclksrc** <*options*> command, as shown in the following example:

```
M8850_LA.8.PXM.a > cnfncdpclksrc 7.35 0 -priority 100 -stratumLevel 2
```

Table 7-14 describes the options available for the **cnfncdpclksrc** command.

Table 7-14 cnfncdpclksrc Command Parameters

Parameter	Description
port-id	Port identifier. For clocking ports, the port identifier is 7.35 or 7.36. For internal oscillator, the port identifier is 255.255.
prs -id	Determines the primary reference source. Enter 0 for an external source, or 255 for an internal source.
-priority	Prioritizes the clock source. Enter a number in the range from 1 to 255. Default = 128
-stratumLevel	Determines the stratum level of the clock source. Possible levels are 1, 2E, 2, 3E, 3, 4E, or 4. Default = 3

Note Once you enable NCDP, it is automatically enabled on all NNI ports on the switch.

Enter the **dspncdpclksrc** <*portid*> command to ensure the NCDP configuration took effect. Replace <*portid*> with the 7.35 or 7.36 (for T1/E1 ports). The following example displays the NCDP configuration on an E1 port.

```
M8850_LA.8.PXM.a > dspncdpclksrc 7.35
Best clock source           : No
Priority                    : 100
Stratum level               : 2
Primary reference src id    : 0(external)
Health                      : Bad
```

Configuring an NCDP Port

Once you enable NCDP on your node, NCDP is automatically enabled on all the node's NNI ports. You can alter the default NCDP port configuration through the **cnfncdpport** <*portid*> <*options*> command, as shown in the following example:

```
M8850_LA.8.PXM.a > cnfncdpport 1:2.2:2 -ncdp enable -vpi 1 -vci 1 -admincost 1 -pcr 200
-scr 100  -mcr50
```

Table 7-15 describes the **cnfncdpport** command options.

Table 7-15 cnfncdpport Command Parameters

Parameter	Description
portid	Port identifier in the format slot:bay.line:ifnum. These parameters are described in Table 7-1.
-ncdp	Enables/disables NCDP on the current port. Default = disable
-vpi	Reserved VPI of the signaling channel, in the range from 0 through 4095. There is no reason to change this number unless a relevant card's partition is intended to support a specific VPI. **Note** If you change the VPI, it must be within the valid partition range or it will be disabled. Default = 0
-vci	Reserved VCI of the signaling channel, in the range from 32 through 65535. Normally, no reason exists to change it. **Note** If you change the VCI, it must be within the valid partition range or it will be disabled. Default = 34
-adminCost	Sets the routing cost of the port, in the range from 1 through (2^24-1). For example, if the equipment were in an area with a large amount of electronic noise, or if the switch carried a particularly large amount of traffic, you might want to raise the cost.) Default = 10
-pcr	Specifies the peak cell rate (PCR) for the port. Default = 250 cells per second

Table 7-15 cnfncdpport Command Parameters (continued)

Parameter	Description
-scr	Specifies the sustained cell rate (SCR) for the port. Default = 150 cells per second
-mbs	Specifies the maximum burst size (MBS) for the port. Default = 100 cells

Enter the **dspncdpport** <*portid*> command to verify that the NCDP parameters were set properly.

```
M8850_LA.8.PXM.a > dspncdpport 1:2.2:2
Network clock mode              : enable
Ncdp Vc status                  : up
Network clock vpi               : 0
Network clock vci               : 34
Admin cost                      : 10
Service Category                : sig
PCR                             : 250
SCR                             : 150
MBS                             : 100

M8850_LA.8.PXM.a >
```

Displaying NCDP Clock Source Information

The following sections describe how to display information about NCDP configuration in your network.

Display the Current NCDP Root Clock

Enter the **dspncdp** command to display the current NCDP root clock source on the network.

```
M8850_LA.8.PXM.a > dspncdp
Distribution Mode               : ncdp
Node stratum level              : 3
Max network diameter            : 5
Hello time interval             : 300
Holddown time interval          : 300
Topology change time interval   : 300
Root Clock Source               : 255.255
Root Stratum Level              : 3
Root Priority                   : 128
Last clk src change time        : Feb 21 2002 17:41:38
Last clk src change reason      : Topology Changed

M8850_LA.8.PXM.a >
```

Table 7-16 describes the objects displayed by the **dspncdp** command.

Table 7-16 dspncdp Command Objects

Parameter	Description
Distribution Mode	Current enabled method of clock distribution. If the method chosen is manual, NCDP is turned off, and vice-versa.
Node stratum level	Stratum level of the clock source. Possible levels are 1, 2E, 2, 3E, 3,4E, or 4.
Max network diameter	Maximum network diameter measured in hops.
Hello time interval	Time interval between each configuration pdu sent out by a node to advertise the best clock source in the network. This time interval is specified in milliseconds in the display.
Topology change time interval	Time interval for which the topology change detection field in the configuration pdu bit will be set. Having the topology change detection option set informs the recipient node that it needs to transmit configuration pdus out to advertise to its neighbors about recent topology or root clock changes.
Root Clock Source	Clock port from which the node is deriving the clock signal. 255.255 means the node is deriving the clock source from an internal oscillator.
Root Stratum Level	Stratum level of the network's root clock source. Possible levels are 1, 2E, 2, 3E, 3,4E, or 4.
Root Priority	Priority of the network's root clock source.
Last clk src change time	Time when the root clock source last changed.
Last clk src change reason	Reason why the root clock source last changed.

Display A Specific NCDP Clock Sources

Enter the **dspncdpclksrc** command to display configuration information about a specific NCDP clock sources on the network.

```
M8850_LA.8.PXM.a > dspncdpclksrc 7.35
Best clock source           : No
Priority                    : 100
Stratum level               : 2
Primary reference src id    : 0(external)
Health                      : Bad

M8850_LA.8.PXM.a >
```

Table 7-17 describes the objects displayed by the **dspncdpclksrc** command.

Table 7-17 dspncdpclksrc Command Objects

Parameter	Description
Best clock source	Describes whether the specified clock source is currently the best (or root) clock source in the network.
Priority	Displays the specified clock source's priority.
Stratum Level	Stratum level of the specified clock source. Possible levels are 1, 2E, 2, 3E, 3,4E, or 4.
Primary reference src id	Displays the specified clock sources ID.
Health	Describes the current health of the specified clock source. The possible health states ar described below. Good—Specified clock source is the current root clock or the second best clock source, and is in good condition. Bad—Specified clock source was the root clock at some point, but went bad and is no longer available. Wideband-Locking—Specified clock source is being qualified by the clock manager and is in wideband-locking mode. Narrowband-Locking—Specified clock source is being qualified by the clock manager and is in narrowband-locking mode. Unknown—Specified clock source is not the root clock source.

Display All NCDP Clock Sources

Enter the **dspncdpclksrcs** command to display all configured NCDP clock sources on the network.

```
M8850_LA.8.PXM.a > dspncdpclksrcs

PortId    Best clk src    Priority   Stratum level  Prs id          Health
7.35 (e1) No              100        2              0(external)     Bad
7.36 (e1) No              128        3              0(external)     Bad
255.255   Yes             128        3              255(internal)   Good

M8850_LA.8.PXM.a >
```

Table 7-18 describes the objects displayed by the **dspncdpclksrcs** command.

Table 7-18 dspncdpclksrcs Command Objects

Parameter	Description
PortID	Current enabled method of clock distribution. If the method chosen is manual, NCDP is turned off, and vice-versa.
Best clk src	Displays *Yes* if a clock source is a root clock source or a second best clock source, or displays *No* if a clock source is not a root or second best clock source.
Priority	Priority of each clock source.
Stratum Level	Stratum level of each clock source. Possible levels are 1, 2E, 2, 3E, 3,4E, or 4.
Prs id	Primary source ID (prs-id) is either 0 for external or 255 for internal.The internal primary source is the free-running oscillator on the PXM45 back card. (Even though the syntax line and the CLI help indicates a range, the only choice in the current release is 0 or 255.) Default: 255
Health	Describes the current health of each clock source in the network. The possible health states ar described below. Good—Specified clock source is the current root clock or the second best clock source, and is in good condition. Bad—Specified clock source was the root clock at some point, but went bad and is no longer available. Wideband-Locking—Specified clock source is being qualified by the clock manager and is in wideband-locking mode. Narrowband-Locking—Specified clock source is being qualified by the clock manager and is in narrowband-locking mode. Unknown—Specified clock source is not the root clock source.

Display All NCDP Ports in the Network

Enter the **dspncdpports** command to display general details about all signaling ports for NCDP.

```
U1.8.PXM.a > dspncdpports

PortId     Clock mode  Clock Vpi   Clock Vci   Admin Cost       Ncdp Vc
6:1.1:1    disable     0           34          10               down
6:1.1:2    disable     0           34          10               down
6:1.1:3    disable     0           34          10               down
```

Table 7-19 describes the objects displayed by the **dspncdpports** command.

Table 7-19 dspncdpports Command Objects

Parameter	Description
PortID	Port identifier in the format slot:bay.line:ifnum. Table 7-1 describes these parameters.
Clock mode	Displays whether NCDP is enabled or disabled on each port.
Clock Vpi	Displays the VPI of the signaling channel for each port.
Clock Vci	Displays the VCI of the signaling channel for each port.
Admin Cost	Displays the routing cost of the port.
Ncdp Vc	Displays whether the Ncdp VC is up or down.

Display An NCDP Port

Enter the **dspncdpport** <*portid*> command to display detailed information for a specified NCDP signaling port. Replace <*portid*> with the port identifier in the format slot:bay.line:ifnum.

```
U1.8.PXM.a > dspncdpport 6:1.1:1
Network clock mode              : disable
Ncdp Vc status                  : down
Network clock vpi               : 0
Network clock vci               : 34
Admin cost                      : 10
Service Category                : sig
PCR                             : 250
SCR                             : 150
MBS                             : 100
```

Table 7-20 describes the objects displayed by the **dspncdpport** command.

Table 7-20 dspncdpport Command Objects

Parameter	Description
Clock mode	Displays whether NCDP is enabled or disabled on each port.
Ncdp Vc status	Displays whether the Ncdp VC is up or down.
Network clock vpi	Displays the VPI of the signaling channel for each port.
Network clock vci	Displays the VCI of the signaling channel for each port.
Admin Cost	Displays the routing cost of the port.
Service Category	Displays the service category for the current NCDP port.
PCR	Displays the peak cell rate (PCR) for the port.

Table 7-20 dspncdpport Command Objects (continued)

Parameter	Description
SCR	Displays the sustained cell rate (SCR) for the port.
MBS	Displays the maximum burst size (MBS) for the port.

Deleting an NCDP Clock Source

Enter the **delncdpclksrc** <*portid*> command to delete a clock source from the network. Replace <*portid*> with the 7.35 (for E1 ports) or 7.36 (for T1 ports).

```
M8850_LA.8.PXM.a > delncdpclksrc 7.35

M8850_LA.8.PXM.a >
```

Managing Manually Configured Clocks Sources

The following sections provide commands and procedures for managing manually configured clock source.

View the Configured Clock Sources

One command allows you to view the configured clock sources and determine which clock source is active. To view the configured clock sources, use the following procedure.

Step 1 Establish a configuration session at any access level.

Step 2 Enter the **dspclksrcs** command.

```
mgx8850a.7.PXM.a > dspclksrcs
```

The following example shows a display with neither primary nor secondary clocks configured. This is the default configuration of a switch, which uses the internal clock as the network clock source. Whenever the active clock is listed as null, the switch is using the internal clock.

```
pop20two.7.PXM.a > dspclksrcs
Primary clock type:     null
Primary clock source:   0.0
Primary clock status:   not configured
Primary clock reason:   okay
Secondary clock type:   null
Secondary clock source: 0.0
Secondary clock status:   not configured
Secondary clock reason:   okay
Active clock:           internal clock
source switchover mode: non-revertive
```

In the following example, the display shows that both the primary and secondary clocks are configured for network clock sources. The primary clock source is coming from port 4 on the AXSM card in slot 10. The primary clock source is active. The secondary clock source is coming from port 1 on the AXSM card in slot 9.

```
pop20one.7.PXM.a > dspclksrcs
Primary clock type:     generic
Primary clock source:   10:2.2:4
Primary clock status:   ok
Primary clock reason:   okay
Secondary clock type:   generic
Secondary clock source: 9:1.1:1
Secondary clock status:   ok
Secondary clock reason:   okay
Active clock:           primary
source switchover mode: non-revertive
```

Reconfigure Clock Sources

The procedure you use to reconfigure a clock source depends on whether or not you need to change the role of the clock source. If the clock source keeps its role as either primary or secondary, just enter a new **cnfclksrc** command as described in the following locations:

- To reconfigure a clock source for a BITS clock, see the "Configuring Clock Sources" section in Chapter 2, "Configuring General Switch Features."
- To reconfigure a clock source to use an AXSM line, see "Configuring AXSM Line Clock Sources," in Chapter 6, "Provisioning AXSM Communication Links."

When reconfiguring a clock source from primary to secondary or from secondary to primary, you must delete both existing clock sources and define new clock sources. The switch will not allow you to create two primary or two secondary clock sources, and the switch will not allow you to configure the same line as both primary and secondary clock sources. After you have deleted the old clock source, you can use the appropriate procedure (referenced above) to define a new clock source.

To delete a clock source, enter the **delclksrc** command as described in the next section.

Delete Clock Sources

Deleting a clock source deletes the definition of the clock source, not the clock source itself. You might want to delete a primary or secondary clock source definition so that you can reassign the clock source to another line.

To delete a clock source, use the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Display the clock source information by entering the **dspclksrcs** command.

You will need the information in this display to delete the clock source.

Step 3 To delete a clock source, enter the **delclksrc** command.

```
mgx8850a.7.PXM.a > delclksrc <priority>
```

The following example deletes a primary clock source.

```
mgx8850a.7.PXM.a > delclksrc primary
```

Step 4 To verify that a clock source has been deleted, enter the **dspclksrcs** command. When the primary or secondary clock source is deleted, the clock type is set to **null**.

Restore a Clock Source After Failure

The procedure you use to reconfigure a clock source depends on whether or not you need to change the role of the clock source. If the clock source keeps its role as either primary or secondary, just enter a new **cnfclksrc** command as described in the following locations:

The *revertive* option for clock sources connected to the PXM45 allows a primary clock source to resume operation as the primary clock source after a failure and restoration of the clock signal. However, if you have the revertive option disabled, or if your primary clock source is connected to an AXSM line, you will have to reconfigure the primary clock source after it is restored. To reconfigure the clock source as a BITS clock source, see the "Configuring Clock Sources" section in Chapter 2, "Configuring General Switch Features." To reconfigure the clock source as a AXSM line clock source, see the "Configuring AXSM Line Clock Sources" section in Chapter 6, "Provisioning AXSM Communication Links."

Tip Enter the **dspclksrcs** command to display the current configuration settings for the primary clock source. Having this information available makes it easier to re-enter the **cnfclksrc** command.

Note To change a clock source on the PXM45 from nonrevertive to revertive, enter the **cnfclksrc** with the option **–revertive enable**.

When the primary clock source is restored on the master clock node, you may have to reconfigure the primary clock source at each remote node where the node has switched from the primary source to the secondary source. This reconfiguration is necessary only if the local node has detected a change in the master clock source.

To determine if you need to reconfigure the primary clock at a nonmaster node, enter the **dspclksrcs** command. If the active clock has changed to either secondary or **internal clock**, you must use the **cnfclksrc** command to reconfigure the primary clock source for that node.

Managing Feeder Connections

The procedure for defining feeder connections is described in Chapter 6, "Provisioning AXSM Communication Links." Table 7-21 lists commands that you can use to manage feeder connections.

Table 7-21 Feeder Management Commands

Command	Description
dspfdrs	Display the feeders configured on an AXSM card.
dspfdr <*ifnum*>	Display the feeder configuration for a specific interface. Replace <*ifnum*> with the interface number.
dspfdrstat <*ifnum*>	Display statistics on a feeder interface. Replace <*ifnum*> with the interface number.
clrfdrstat <*ifnum*>	Clear statistics counters for a feeder interface. Replace <*ifnum*> with the interface number.
delfdr <*ifnum*>	Remove the feeder configuration from an interface. Replace <*ifnum*> with the interface number.

Displaying SVCs

To display active SVCs, use the following procedure.

Step 1 Establish a CLI management session at any user access level.

Step 2 Enter the **dsppncons** command.

```
popeye2.7.PXM.a > dsppncons
```

The following is an example report for the **dsppncons** command.

```
popeye2.7.PXM.a > dsppncons
           Port   VPI   VCI CallRef       X-Port    VPI   VCI  CallRef Type OAM-Type
        9:1.1:1     0    32      1       9:1.2:2      0    36       5   PTP    No
    Calling-Addr:47.666666666666666666666666.666666666666.00
    Called-Addr: 47.111111111111111111111111.111111111111.64
        9:1.2:2     0    36      5       9:1.1:1      0    32       1   PTP    No
    Calling-Addr:47.666666666666666666666666.666666666666.00
    Called-Addr: 47.111111111111111111111111.111111111111.64
```

Managing Controllers

Cisco MGX 8850 and Cisco MGX 8950 Release 2 switches support one PNNI controller and up to two Label Switch Controllers. The controller identifies a network control protocol to the Virtual Switch Interface (VSI) that runs on the node.

Adding Controllers

To add a controller, use the following procedure.

Step 1 Establish a configuration session at any user access level.

Step 2 Enter the **addcontroller** command to add a controller to the node.

```
pop20two.9.PXM45.a > addcontroller <cntrlrId> i <cntrlrType> <lslot> [cntrlrName}
```

Table 7-22 describes the parameters for this command.

Table 7-22 Parameters for the addcontroller Command

Parameter	Description
<cntrlrId>	Number that identifies a network controller. The numbers are reserved as follows: • 2 = PNNI • 3 = LSC (Label Switch Controller), also known as Multiprotocol Label Switch Controller (MPLS) **Note** The controller ID (*cntrlrId*) must be the same as the controller type (*cntrlrType*).
i	Keyword indicating that this controller is internal.
<cntrlrType>	Number that identifies a network controller. The numbers are reserved as follows: • 2 = PNNI • 3 = LSC (Label Switch Controller), also known as Multiprotocol Label Switch Controller (MPLS) **Note** The controller type (*cntrlrType*) must be the same as the controller ID (*cntrlrId*).
<lslot>	The logical slot number on which the controller resides. For the PXM-45, *lslot* is *7* regardless of which card is active.
[*cntrlrName*}	(Optional) A string to serve as a name for the controller.

Step 3 To display all controllers on the switch and verify the added controller, enter the **dspcontrollers** command.

```
MGX8850.7.PXM.a > dspcontrollers

MGX8850                          System Rev: 02.00   Jul. 30, 2000 09:39:36 GMT
MGX8850                                                 Shelf Alarm: NONE
Number of Controllers:        1
Controller Name:              PNNITWO
Controller Id:                2
Controller Location:          Internal
Controller Type:              PNNI
Controller Logical Slot:      7
Controller Bay Number:        0
Controller Line Number:       0
Controller VPI:               0
Controller VCI:               0
Controller In Alarm:          NO
Controller Error:
```

Deleting Controllers

To delete a controller, use the following procedure.

Step 1 Establish a configuration session at any user access level.

Step 2 Enter the **delcontroller** command to prevent the switch from using a specified controller.

```
pop20two.9.PXM45.a > delcontroller <cntrlrId>
```

Replace <*cntrlrId*> with *2* to identify PNNI controller, or *3* to identify an LSC controller.

Caution Do not enter the **delcontroller** command on a card with existing connections. If you do, those connections cannot be recovered until the controller is re-added using the **addcontroller** command, and the AXSM cards or the entire node is reset. Otherwise, ports remain in the provisioning state.

Step 3 To verify that the switch is no longer using the specified controller, enter the **dspcontrollers** command.

Note The **delcontroller** command does not delete the controller software, but directs the switch not to use it.

Managing Service Class Templates

Service Class Templates (SCTs) are introduced in the "Selecting and Viewing Service Class Templates" section in Chapter 3, "Preparing AXSM Cards and Lines for Communication." Separate SCTs are available for PXM1E, AXSM, and FRSM cards.

Individual SCT settings cannot be modified using the CLI. If you want to modify specific SCT parameter settings and then save the SCT, you must use Cisco Wan Manager (CWM).

If you want to modify ATM parameters after the SCT is loaded, but you do not want to save the settings as an SCT, you can use the following CLI commands: **cnfabr**, **cnfcon**, or **cnfabrtparmdft**.

Note Port SCTs can be changed with connections provisioned on the port. However, the port needs to be administratively downed to effect this change. Hence this is service affecting.

The following sections describe how to

- Display all registered SCTs on a switch.
- Display the SCT assigned to a port
- Display the SCT assigned to a card
- Display the SCT settings in use on a port
- Display the SCT settings in use on a card
- Apply a new SCT version to a card or port
- Delete SCTs from your network

Displaying all Registered SCTs on a Switch

To display all registered SCTs on a switch and their status, enter the **dspscts** command at the active PXM switch prompt.

```
D1.8.PXM.a > dspscts
card   sct  sctid major minor checksum status Description
 type   type       ver   ver
 ------ ---- ----- ----- ----- -------- ------ -----------------
 AXSM PORT 00000 00001     4 0x54898046  valid default_upgrade
 AXSM PORT 00003 00001     0 0xb4b8fd6  valid default_upgrade
 AXSM PORT 00004 00001     0 0xe58b677a  valid default_upgrade
 AXSM PORT 00005 00001     0 0x5454d869  valid default_upgrade
 AXSM PORT 00102 00001     0 0x5d9df83  valid default_upgrade
 AXSM PORT 00116 00001     0 0xc2cf85bb  valid default_upgrade
 AXSM PORT 00117 00001     0 0x2394e294  valid default_upgrade
 AXSM PORT 00119 00001     0 0x1992dbf0  valid default_upgrade
 AXSM CARD 00002 00001     0 0xecc5702b  valid default_upgrade
 AXSM CARD 00003 00001     0 0xb4b8fd6  valid default_upgrade
 AXSM CARD 00004 00001     0 0xe58b677a  valid default_upgrade
 AXSM CARD 00005 00001     0 0x5454d869  valid default_upgrade
 AXSM CARD 00103 00001     2 0xe8ef10bd  valid junk
 AXSM CARD 00104 00001     2 0xef1419e6  valid jlfjglfdj
 AXSM CARD 00105 00001     2 0xf738210d  valid default_upgrade
 AXSM CARD 00107 00001     0 0x2ea70337  valid default_upgrade
 AXSM CARD 00108 00001     0 0x37d00c5c  valid default_upgrade
 AXSM CARD 00109 00001     0 0x3ff91380  valid default_upgrade
 AXSM CARD 00110 00001     0 0x48221aa4  valid default_upgrade
```

```
Type <CR> to continue, Q<CR> to stop:
card   sct  sctid major minor checksum status Description
 type   type       ver   ver
 ------ ---- ----- ----- ----- -------- ------ -----------------
 AXSM CARD 00113 00001     0 0x5f9d2e0f  valid default_upgrade
 AXSM CARD 00114 00001     0 0x67c63533  valid default_upgrade
 AXSM CARD 00115 00001     0 0x6fef3c57  valid default_upgrade
 AXSM CARD 00121 00001     1 0x7189a28c  valid default_upgrade
 AXSM CARD 00122 00001     1 0x6fae1018  valid hi
AXSME PORT 00003 00001     0 0x46f6c566  valid default_upgrade
AXSME CARD 00003 00001     0 0x46f6c566  valid default_upgrade
```

Table 7-23 describes the **dspscts** command display components.

Table 7-23 dspscts Command Display Components

Object	Description
card type	Type of Service Module to which the SCT is registered. Possible service modules are AXSM, AXSME, PXM1E, and FRSM.
sct type	Describes whether the SCT is a port SCT or a card SCT.
sct id	A 16-bit number uniquely identifying the SCT.
major ver	A 16-bit number which identifies the major version of the SCT. When an object is deleted or added to an SCT MIB and an upgrade is required, the major version number of the file changes. The major version of a file is always in consecutive order and cannot be deleted.
minor ver	A 16-bit number which identifies the minor version of the SCT. Each time an SCT file is modified, saved, and downloaded, the minor version number changes. A minor version changed does not require an upgrade or re-configuration of the card/port database. The minor version of a file can be deleted; therefore, the minor version number of a file may not be in consecutive order from the previous minor version of the same file.
checksum	An SCT identification number between 0 and 65535 that matches the checksum embedded in the SCT file. The checksum number for all new SCT files is advertised to the user through the release notes.
status	Status of the SCT file on the switch. The status of the SCT would be marked as "failed" if the file does not exist or does not match the major and minor versions.
description	Describes the SCT file.

Displaying the SCT Assigned to a Port

To display the SCT assigned to a port, use the following procedure.

Step 1 Establish a configuration session at any user access level.

Step 2 Enter the **dspports** command:

```
pop20two.9.AXSM.a > dspports
```

The **dspports** report displays a column labeled “Port SCT Id,” which identifies the SCT assigned to each port, as shown in the following example:

```
pop20two.1.AXSM.a > dspports
ifNum Line Admin Oper. Guaranteed Maximum     Port SCT Id     ifType  VPI
           State State Rate       Rate                                (VNNI only)
----- ---- ----- ----- ---------- --------- ----------------- ------ ----------
    1  1.1    Up    Up    1412830   1412830   2                   NNI    0
    2  1.2    Up    Up    1412830   1412830   2                   NNI    0
    3  2.1    Up    Up    1412830   1412830   2                   NNI    0
    4  2.2    Up    Up    1412830   1412830   2                   UNI    0
```

Displaying the SCT Assigned to a Card

To display the SCT assigned to a card, use the following procedure.

Step 1 Establish a configuration session at any user access level.

Step 2 Enter the following command:

```
pop20two.9.AXSM.a > dspcd
```

The **dspcd** report displays a row labeled “Card SCT Id,” which identifies the SCT assigned to the card.

```
pop20two.1.AXSM.a > dspcd
                    Front Card          Upper Card          Lower Card
                    ----------          ----------        ------------
Card Type:          AXSM-4-622          SMFIR-2-622         SMFIR-2-622
State:              Active              Present             Present
Serial Number:      SAK03500088         SBK0406002V         SAK0346003F
Boot FW Rev:        2.0(252)A1          ---                 ---
SW Rev:             2.0(252)A1          ---                 ---
800-level Rev:      M6                  14                  13
Orderable Part#:    800-5774-5          800-5383-1          800-5383-1
PCA Part#:          73-4504-2           73-4125-1           73-4125-1
Reset Reason:On Power up
Card SCT Id: 2

Type <CR> to continue, Q<CR> to stop:
```

Displaying Port SCT Settings

To view the port SCT settings, use the following procedure.

Step 1 Establish a CLI management session at any user access level.

Step 2 Enter the following command:

```
pop20two.9.AXSM.a > dspportsct <bw|gen|cosb|vcThr|cosThr> <ifNum>
```

Select one of the options to display one of the five SCT configuration reports, and replace <*ifNum*> with the number of the port you want to view. Table 7-24 describes the reports for each of these options.

Table 7-24 Options for dspcdsct Command

Option	Description
bw	Displays bandwidth and policing parameters
gen	Displays general SCT parameters
cosb	Displays COSB parameters
vcThr	Displays virtual circuit threshold parameters
cosThr	Displays COSB threshold parameters

Note The option names are case sensitive. The switch does not recognize the **vcthr** option. You must enter **vcThr**.

The following sections display the reports for each of the **dspportsct** command options.

Port SCT General Parameters (dspportsctgen)

The following report appears when you enter the **dspportsct gen** command:

```
pop20two.10.AXSM.a > dspportsct gen 1
+-----------------------------------------------------------------------------------------------+
Service Class Template [2] : General Parameters
+-----------------------------------------------------------------------------------------------+
| SERV-TYPE | COSB_NUM | CAC_TYPE | UPC_ENB   | CLP-SELEC |     GCRA-1     |     GCRA-2     | CI-CNTRL |
+-----------------------------------------------------------------------------------------------+
| CBR.1     | 00000003 |    B-CAC |GCRA1-ENB | 000000003 |        DISCARD |        DISCARD | DISABLED |
| VBR-RT.1  | 00000004 |    B-CAC |GCRA 1 & 2| 000000002 |        DISCARD |        DISCARD | DISABLED |
| VBR-RT.2  | 00000004 |    B-CAC |GCRA 1 & 2| 000000001 |        DISCARD |        DISCARD | DISABLED |
| VBR-RT.3  | 00000004 |    B-CAC |GCRA 1 & 2| 000000001 |        DISCARD |        SET-CLP | DISABLED |
| VBR-nRT.1 | 00000005 |    B-CAC |GCRA 1 & 2| 000000002 |        DISCARD |        DISCARD | DISABLED |
| VBR-nRT.2 | 00000005 |    B-CAC |GCRA 1 & 2| 000000001 |        DISCARD |        DISCARD | DISABLED |
| VBR-nRT.3 | 00000005 |    B-CAC |GCRA 1 & 2| 000000001 |        DISCARD |        SET-CLP | DISABLED |
| UBR.1     | 00000006 |  LCN_CAC |GCRA1-ENB | 000000003 |        DISCARD |        DISCARD | DISABLED |
| UBR.2     | 00000006 |  LCN_CAC |GCRA1-ENB | 000000003 |   DSCD/SET-CLP |        DISCARD | DISABLED |
| ABR       | 00000001 |    B-CAC |GCRA1-ENB | 000000003 |        DISCARD |        DISCARD | DISABLED |
| CBR.2     | 00000003 |    B-CAC |GCRA 1 & 2| 000000001 |        DISCARD |        DISCARD | DISABLED |
| CBR.3     | 00000003 |    B-CAC |GCRA 1 & 2| 000000001 |        DISCARD |        SET-CLP | DISABLED |
+-----------------------------------------------------------------------------------------------+
```

Table 7-25 describes the SCT General Parameters shown in the example.

Table 7-25 Service Class Template: SCT General Parameters

Parameter	Range	Description
SERV-TYPE		The service type (for example, CBR, VBR, ABR) to which the parameters (for example, COSB_NUM, CAC_TYPE, UPC_ENB) in this table apply.
COSB_NUM	1 to 16	Class of Service Buffer Number. The number that identifies one of the sixteen CoS buffers. A CoS buffer is a buffer that services connections with similar QoS requirements.
CAC_TYPE		Connection Admission Control. Used by an ATM switch during setup to determine if a connections requested QoS conforms to the guaranteed QoS standards for ATM connections. LCN_CAC: Logical Connection Number CAC B_CAC: Basic - CAC E_CAC: Enhanced - CAC
UPC_ENB		Usage Parameter Control Enable. Enables or disables GCRA policing functions on the connection. GCRA1-ENB: Enables GCRA1 only. GCRA 1 and 2: Enables both GCRA1 and GCRA2.
CLP-SELEC	1 to 4	Cell Loss Priority Select. Specifies whether a bucket will police for CLP (0+1) or CLP (0) in the dual leaky bucket policing action. 1 - Bucket 1: CLP (0+1) - Bucket 2: CLP (0) 2 - Bucket 1: CLP (0+1) - Bucket 2: CLP (0+1) 3 - Bucket 1: CLP (0+1) - Bucket 2: Disabled 4 - Bucket 1: CLP (0+1) with Maximum Frame Size (MFS)
GCRA-1		Generic Cell Rate Algorithm – Bucket 1. In ATM, an algorithm that defines conformance with respect to the traffic contract of the connection. For each cell arrival, the GCRA determines whether the cell conforms to the traffic contract. **Note** If UPC-Enable is set to disable, this object is not used. Choose one of the following options to indicate how cells failing the first policer bucket should be handled: 1 - Discard 2 - Set CLP bit 3 - Set CLP of untagged cells, discard tagged cells.

Table 7-25 Service Class Template: SCT General Parameters (continued)

Parameter	Range	Description
GCRA-2	1 to 3	Generic Cell Rate Algorithm – Bucket 2. In ATM, an algorithm that defines conformance with respect to the traffic contract of the connection. For each cell arrival, the GCRA determines whether the cell conforms to the traffic contract. **Note** If UPC-Enable is set to disable, this object is not used. Choose one of the following options to indicate how cells failing the second policer bucket should be handled: 1 - Discard 2 - Set CLP bit 3 - Set CLP of untagged cells, discard tagged cells.
CI-CNTRL	1 - Enabled 2 - Disabled	Congestion Indication Control. Indicates whether the EFCI Threshold has been exceeded.

Port SCT COSB Parameters (cosb)

The following report appears when you enter the **dspportsct cosb** command:

```
pop20two.10.AXSM.a > dspportsct cosb
+-----------------------------------------------------------------------------------+
|Service Class Template [02] : COSB Parameters
+-----------------------------------------------------------------------------------+
| COSB | MIN-RATE | MAX-RATE | MIN-PRIORITY | EXCESS-PRIORITY | ERS ENABLE |   CLR   |
+-----------------------------------------------------------------------------------+
| 0001 | 00000000 | 00000100 |          000 |             002 |     ENABLE | 10^-01 |
| 0002 | 00000000 | 00000100 |          000 |             002 |     ENABLE | 10^-01 |
| 0003 | 00000000 | 00000100 |          000 |             000 |    DISABLE | 10^-05 |
| 0004 | 00000000 | 00000100 |          000 |             001 |    DISABLE | 10^-03 |
| 0005 | 00000000 | 00000100 |          000 |             001 |    DISABLE | 10^-01 |
| 0006 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0007 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0008 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0009 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0010 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0011 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0012 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0013 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0014 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0015 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0016 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
+-----------------------------------------------------------------------------------+
```

Table 7-26 describes the SCT COSB parameters shown in the example.

Table 7-26 Service Class Template: SCT COSB Parameters

Label	Range and Units	Description
COSB	—	Class of Service Buffer. A buffer or queue which serves connections with similar QoS requirements.
MIN-RATE	1—1000000	This field is no longer used and is currently always set to its default value (0) and will be removed in future releases.
MAX-RATE	1—1000000	This field is no longer used and is currently always set to its default value (100) and will be removed in future releases.
MIN-PRIORITY	0—15	The priority at which this CoSB will be serviced to guarantee its minimum and maximum bandwidth requirements. • 0 is highest priority • 15 is lowest priority
EXCESS-PRIORITY	0—15	The priority at which this COSB will be given access to excess bandwidth. • 0 is highest priority • 15 is lowest priority
ERS ENABLE	1 = Enabled 2 = Disabled	Indicates whether Explicit Rate Stamping (ERS) is enabled or disabled.
CLR	1—15	Cell Loss Ratio for this COSB. The minimum supported CLR is 10^{-6} and maximum supported CLR is 10^{-10}

Port SCT Virtual Circuit Threshold Parameters (vcThr)

The following report appears when you enter the **dspportsct vcThr** command:

```
pop20two.10.AXSM.a > dspportsct vcThr 1
+-------------------------------------+
| SCT - VERSION | FIRMWARE - VERSION |
| 0000000000001 | 000000000000000001 |
+-------------------------------------+
+------------------------------------------------------------------------------------------
----------------+
Service Class Template [5] : VC Threshold Parameters
+------------------------------------------------------------------------------------------
----------------+
| SERV-TYPE | VC THRESH | PACKET |  MAX_CELL  |  EFCI   | CLP_HI  |  EPD0   | CLP_LO  |
SCALING | SCALING |
|           | TBL IDX   |  MODE  |   THRESH   |         |         |         |  EPD1   |
COSB    |  Log-If |
+------------------------------------------------------------------------------------------
----------------+
| VSI-SIG   |     002   |    ENB | 0000005000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000002 | 0000002 |
| CBR.1     |     003   |    ENB | 0000002500 | 1000000 | 0800000 | 0600000 | 0800000 |
0000001 | 0000001 |
```

```
| VBR-RT.1  |    004   |    ENB | 0000005000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000002 | 0000002 |
| VBR-RT.2  |    005   |    ENB | 0000005000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000002 | 0000002 |
| VBR-RT.3  |    006   |    ENB | 0000005000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000002 | 0000002 |
| VBR-nRT.1 |    007   |    ENB | 0000025000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000002 | 0000002 |
| VBR-nRT.2 |    008   |    ENB | 0000025000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000002 | 0000002 |
| VBR-nRT.3 |    009   |    ENB | 0000025000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000002 | 0000002 |
| UBR.1     |    010   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000004 | 0000004 |
| UBR.2     |    011   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000004 | 0000004 |
| ABR       |    012   |    ENB | 0000050000 | 0200000 | 0800000 | 0600000 | 0800000 |
0000003 | 0000003 |
| CBR.2     |    013   |    ENB | 0000002500 | 1000000 | 0800000 | 0600000 | 0800000 |
0000001 | 0000001 |
| CBR.3     |    014   |    ENB | 0000002500 | 1000000 | 0800000 | 0600000 | 0800000 |
0000001 | 0000001 |
| TagCOS-0c |    015   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000004 | 0000004 |
| TagCOS-1c |    016   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000004 | 0000004 |
| TagCOS-2c |    017   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000003 | 0000003 |

Type <CR> to continue, Q<CR> to stop:
| TagCOS-3c |    018   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000002 | 0000002 |
| TagCOS-4c |    019   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000004 | 0000004 |
| TagCOS-5c |    020   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000004 | 0000004 |
| TagCOS-6c |    021   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000004 | 0000004 |
| TagCOS-7c |    022   |    ENB | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 |
0000004 | 0000004 |
+-----------------------------------------------------------------------------------
----------------+

pop20two.10.AXSM.a >
```

Table 7-27 describes the SCT VC Threshold parameters shown in the example.

Table 7-27 Service Class Template: SCT VC Threshold Parameters

Label	Range and Units	Description
SERV-TYPE	—	The service type (for example, CBR, VBR, ABR) to which the parameters (for example, EFCI, CLP_HI, EPD0) in this table apply.
VC THRESH TBL IDX	—	An index number into the queue engine VC threshold table.
PACKET MODE	1 - Enabled 2 - Disabled	Enables or disables Packet Discard Mode on the connection.
MAX_CELL THRESH	0 to 5000000 microseconds	The VcMax threshold for CLP (0+1) cells in microseconds.

Table 7-27 Service Class Template: SCT VC Threshold Parameters (continued)

Label	Range and Units	Description
EFCI	0 to 1000000	Explicit Forward Congestion Indication. The VC EFCI discard threshold. This value is a percentage of MAX_CELL THRESH. 1000000 is equal to 100%.
CLP_HI	0 to 1000000	Cells Loss Priority - High. The high hysteresis threshold at which CLP (1) cells will be discarded. The cells will continue to be discarded until the CLP_LO threshold is reached. This value is a percentage of MAX_CELL THRESH. 1000000 is equal to 100%.
EPD0	0 to 1000000	Early Packet Discard 0. The maximum threshold for CLP(0+1) cells. This value is a percentage of the MAX_CELL THRESH for the connection. 1000000 is equal to 100%.
CLP_LO /EPD1	0 to 1000000	Cells Loss Priority Low / Early Packet Discard 1. The low hysteresis threshold at which CLP (1) cells will stop being discarded. If packet mode is enable, EPD1 executes.
SCALING COSB	1 to 4	Class of Service Scaling Class. Indicates which of the four Scaling Class Tables (1 to 4, see Table 7-28) to use for a connection. Each table is for a specific service category and has an index of 16 entries. Each index entry contains a percentage by which to scale traffic on a connection to reduce CoS buffer congestion. The hardware generates the index and selects the entries as needed. Each entry is the ratio of the COSB cell count to the COSB maximum threshold. CoS scaling occurs when the CoSB cell count is approximately 50% of the CoSB max threshold.
SCALING Log-If	1 to 4	Logical Port Scaling Class. Indicates which of the four Scaling Class Tables (1 to 4, see Table 7-29) to use on a logical port. Each table is for a specific service category and has an index of 16 entries. Each index entry contains a percentage by which to scale traffic on a connection on a logical port to reduce congestion. The hardware generates the index and selects the entries as needed. Each entry is the ratio of the interface cell count to the interface maximum threshold. Interface scaling occurs when the interface cell count is approximately 50% of the interface max threshold.

Table 7-28 Class of Service (CoS) Scaling Table

Index	Scaling Class Table #1 (CBR)	Scaling Class Table #2 (VBR)	Scaling Class Table #3 (ABR)	Scaling Class Table #4 (UBR)
0	100.00%	100.00%	100.00%	100.00%
1	100.00%	100.00%	100.00%	100.00%
2	100.00%	100.00%	100.00%	100.00%
3	100.00%	100.00%	100.00%	100.00%
4	100.00%	100.00%	100.00%	100.00%
5	100.00%	100.00%	100.00%	100.00%
6	100.00%	100.00%	100.00%	67.00%
7	100.00%	100.00%	100.00%	34.00%
8	100.00%	100.00%	50.00%	20.00%
9	100.00%	50.00%	25.00%	12.00%
10	100.00%	25.00%	12.00%	8.00%
11	100.00%	12.00%	6.00%	4.00%
12	100.00%	6.00%	3.00%	2.50%
13	100.00%	3.00%	1.30%	1.40%
14	100.00%	1.30%	0.75%	1.00%
15	100.00%	0.50%	0.50%	0.50%

Table 7-29 Logical Interface Scaling Table

Index	Scaling Class Table #1 (CBR)	Scaling Class Table #2 (VBR)	Scaling Class Table #3 (ABR)	Scaling Class Table #4 (UBR)
0	100.00%	100.00%	100.00%	100.00%
1	100.00%	100.00%	100.00%	100.00%
2	100.00%	100.00%	100.00%	100.00%
3	100.00%	100.00%	100.00%	100.00%
4	100.00%	100.00%	100.00%	100.00%
5	100.00%	100.00%	100.00%	100.00%
6	100.00%	100.00%	100.00%	67.00%
7	100.00%	100.00%	100.00%	34.00%
8	100.00%	100.00%	50.00%	20.00%
9	100.00%	50.00%	25.00%	12.00%
10	100.00%	25.00%	12.00%	8.00%
11	100.00%	12.00%	6.00%	4.00%
12	50.00%	6.00%	3.00%	2.50%
13	25.00%	3.00%	1.30%	1.40%

Table 7-29 Logical Interface Scaling Table (continued)

Index	Scaling Class Table #1 (CBR)	Scaling Class Table #2 (VBR)	Scaling Class Table #3 (ABR)	Scaling Class Table #4 (UBR)
14	6.00%	1.30%	0.75%	1.00%
15	0.50%	0.50%	0.50%	0.50%

Port SCT COSB Threshold Parameters (cosThr)

The following report appears when you enter the **dspportsct cosThr** command:

```
pop20two.10.AXSM.a > dspportsct cosThr 1
+-----------------------------------------------------------------------------------------------+
Service Class Template [00002] : COSB Threshold Parameters
+-----------------------------------------------------------------------------------------------+
| COSB |COSB THRESH|  MAX_CELL  |   EFCI   |  CLP_HI  |   EPD0   |  CLP_LO  |    RED   |  RED PROB  |
|      |  TBL IDX  |   THRESH   |          |          |          |   EPD1   |          |   FACTOR   |
+-----------------------------------------------------------------------------------------------+
| 0001 |  0000002  |  1000000   | 0200000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0002 |  0000003  |  1000000   | 0200000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0003 |  0000004  |     5000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0004 |  0000005  |    10000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0005 |  0000006  |    50000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0006 |  0000007  |   100000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0007 |  0000008  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0008 |  0000009  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0009 |  0000010  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0010 |  0000011  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0011 |  0000012  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0012 |  0000013  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0013 |  0000014  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0014 |  0000015  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0015 |  0000016  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
| 0016 |  0000017  |  1000000   | 1000000  | 0800000  | 0600000  | 0800000  | 1000000  | 000000015  |
+-----------------------------------------------------------------------------------------------+
```

Table 7-30 describes the SCT COSB parameters shown in the example.

Table 7-30 Service Class Template: SCT COSB Threshold Parameters

Label	Range and Units	Description
COSB	—	Class of Service Buffer. This number identifies a buffer or queue which serves connections with similar QoS requirements.
COSB THRESH TBL IDX	—	An index number into Queue Engine COSB threshold table.
MAX_CELL THRESH	0 to 5000000 microseconds	The maximum threshold, in microseconds, beyond which all CLP (0+1) cells must be dropped.
EFCI	0 to 1000000	Explicit Forward Congestion Indication. The threshold level for congestion indication for ABR traffic using CI control. This threshold is a percentage of the MAX_CELL THRESH for the connection. 1000000 is equal to 100%.

Table 7-30 Service Class Template: SCT COSB Threshold Parameters (continued)

Label	Range and Units	Description
CLP_HI	0 to 1000000	Cells Loss Priority High. The maximum number of cells that can be queued in the buffer. CLP(1) cells that exceed this threshold are discarded. This threshold is a percentage of the MAX_CELL THRESH for the connection. 1000000 is equal to 100%.
EPD0	0 to 1000000	Early Packet Discard 0. The maximum number of cells that can be queued in the buffer in packet mode. Any CLP(0+1) cells that exceed this threshold, will be discarded. This threshold is a percentage of the MAX_CELL THRESH for the connection. 1000000 is equal to 100%.
CLP_LO EPD1	0 to 1000000	Cell Loss Priority Low/ Early Packet Discard 1. The threshold at which CLP(0+1) cells that exceed this threshold are discarded. This threshold is a percentage of the MAX_CELL THRESH for the connection. 1000000 is equal to 100%.
RED	0 to 1000000	Random Early Discard. The threshold at which the COSB Random Early Discard is activated. This threshold is a percentage of the MAX_CELL THRESH for the connection. 1000000 is equal to 100%.
RED PROB FACTOR	0 to 15	RED Probability Factor. The mantissa value of probability for maximum discard when RED is activated. Determined as 1/2^<value>.

Displaying Card SCT Settings

To view the card SCT settings, use the following procedure.

Step 1 Establish a CLI management session at any user access level.

Step 2 Enter the **dspcdsct** command.

```
pop20two.9.AXSM.a > dspcdsct <bw|gen|cosb|vcThr|cosThr>
```

Select one of the options to display one of the five SCT configuration reports. Table 7-31 describes the reports for each of these options. The following section lists sample reports for each of these options.

Note The option names are case sensitive. For example, the switch does not recognize the **vcthr** option. You must enter **vcThr**.

Table 7-31 Options for dspcdsct Command

Option	Description
bw	Displays bandwidth and policing parameters.
gen	Displays general SCT parameters.
cosb	Displays COSB parameters.
vcThr	Displays virtual circuit threshold parameters.
cosThr	Displays COSB threshold parameters.

The following sections display the reports for each of the **dspcdsct** command options.

Note For descriptions of the Card SCT parameters refer to Service Class Template Tables 7-6 through 7-11 in the Displaying Port SCT Settings earlier in this chapter.

Card SCT Bandwidth and Policing Parameters (dspcdsct bw)

The following report appears when you enter the **dspcdsct bw** command:

```
pop20two.10.AXSM.a > dspcdsct bw
+-----------------------------------------------------------------------------+
Service Class Template [2] : Bw and Policing Parameters
+-----------------------------------------------------------------------------+
| SERV-TYPE |    PCR    |    SCR    |    MCR    |    MBS    |   CDVT    |    ICR    |
+-----------------------------------------------------------------------------+
| CBR.1     | 00001000 | 00000000 | 00000000 | 00000001 | 00250000 | 00000000 |
| VBR-RT.1  | 00001000 | 01000000 | 00000000 | 00000050 | 00250000 | 00000000 |
| VBR-RT.2  | 00001000 | 01000000 | 00000000 | 00000050 | 00250000 | 00000000 |
| VBR-RT.3  | 00001000 | 01000000 | 00000000 | 00000050 | 00250000 | 00000000 |
| VBR-nRT.1 | 00001000 | 01000000 | 00000000 | 00000050 | 00250000 | 00000000 |
| VBR-nRT.2 | 00001000 | 01000000 | 00000000 | 00000050 | 00250000 | 00000000 |
| VBR-nRT.3 | 00001000 | 01000000 | 00000000 | 00000050 | 00250000 | 00000000 |
| UBR.1     | 00000010 | 00000000 | 00000000 | 00000001 | 00250000 | 00000000 |
| UBR.2     | 00000010 | 00000000 | 00000000 | 00000001 | 00250000 | 00000000 |
| ABR       | 00000010 | 00000000 | 01000000 | 00000001 | 00250000 | 00000000 |
| CBR.2     | 00001000 | 00000000 | 00000000 | 00000001 | 00250000 | 00000000 |
| CBR.3     | 00001000 | 00000000 | 00000000 | 00000001 | 00250000 | 00000000 |
+-----------------------------------------------------------------------------+
```

Card SCT General SCT Parameters (dspcdsct gen)

The following report appears when you enter the **dspcdsct gen** command:

```
pop20two.10.AXSM.a > dspcdsct gen
+-----------------------------------------------------------------------------------------------------+
Service Class Template [2] : General Parameters
+-----------------------------------------------------------------------------------------------------+
| SERV-TYPE | COSB_NUM | CAC_TYPE | UPC_ENB  | CLP-SELEC |     GCRA-1     |     GCRA-2     | CI-CNTRL |
+-----------------------------------------------------------------------------------------------------+
| CBR.1     | 00000003 |    B-CAC |GCRA1-ENB | 000000003 |       DISCARD |       DISCARD | DISABLED |
| VBR-RT.1  | 00000004 |    B-CAC |GCRA 1 & 2| 000000002 |       DISCARD |       DISCARD | DISABLED |
| VBR-RT.2  | 00000004 |    B-CAC |GCRA 1 & 2| 000000001 |       DISCARD |       DISCARD | DISABLED |
| VBR-RT.3  | 00000004 |    B-CAC |GCRA 1 & 2| 000000001 |       DISCARD |       SET-CLP | DISABLED |
| VBR-nRT.1 | 00000005 |    B-CAC |GCRA 1 & 2| 000000002 |       DISCARD |       DISCARD | DISABLED |
| VBR-nRT.2 | 00000005 |    B-CAC |GCRA 1 & 2| 000000001 |       DISCARD |       DISCARD | DISABLED |
| VBR-nRT.3 | 00000005 |    B-CAC |GCRA 1 & 2| 000000001 |       DISCARD |       SET-CLP | DISABLED |
| UBR.1     | 00000006 |  LCN_CAC |GCRA1-ENB | 000000003 |       DISCARD |       DISCARD | DISABLED |
| UBR.2     | 00000006 |  LCN_CAC |GCRA1-ENB | 000000003 | DSCD/SET-CLP |       DISCARD | DISABLED |
| ABR       | 00000001 |    B-CAC |GCRA1-ENB | 000000003 |       DISCARD |       DISCARD | DISABLED |
| CBR.2     | 00000003 |    B-CAC |GCRA 1 & 2| 000000001 |       DISCARD |       DISCARD | DISABLED |
| CBR.3     | 00000003 |    B-CAC |GCRA 1 & 2| 000000001 |       DISCARD |       SET-CLP | DISABLED |
+-----------------------------------------------------------------------------------------------------+
```

Card SCT COSB Parameters (dspcdsct cosb)

The following report appears when you enter the **dspcdsct cosb** command:

```
pop20two.10.AXSM.a > dspcdsct cosb
+------------------------------------------------------------------------------------+
|Service Class Template [02] : COSB Parameters
+------------------------------------------------------------------------------------+
| COSB | MIN-RATE | MAX-RATE | MIN-PRIORITY | EXCESS-PRIORITY | ERS ENABLE |  CLR   |
+------------------------------------------------------------------------------------+
| 0001 | 00000000 | 00000100 |          000 |             002 |     ENABLE | 10^-01 |
| 0002 | 00000000 | 00000100 |          000 |             002 |     ENABLE | 10^-01 |
| 0003 | 00000000 | 00000100 |          000 |             000 |    DISABLE | 10^-05 |
| 0004 | 00000000 | 00000100 |          000 |             001 |    DISABLE | 10^-03 |
| 0005 | 00000000 | 00000100 |          000 |             001 |    DISABLE | 10^-01 |
| 0006 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0007 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0008 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0009 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0010 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0011 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0012 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0013 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0014 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0015 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
| 0016 | 00000000 | 00000100 |          000 |             002 |    DISABLE | 10^-01 |
+------------------------------------------------------------------------------------+
```

Card SCT Virtual Circuit Threshold Parameters (dspcdsct vcThr)

The following report appears when you enter the **dspcdsct vcThr** command:

```
pop20two.10.AXSM.a > dspcdsct vcThr
+---------------------------------------------------------------------------------------------------------+
Service Class Template [2] : VC Threshold Parameters
+---------------------------------------------------------------------------------------------------------+
| SERV-TYPE | VC THRESH | PACKET |  MAX_CELL  |   EFCI  | CLP_HI  |   EPD0  | CLP_LO  | SCALING | SCALING |
|           | TBL IDX   |  MODE  |   THRESH   |         |         |         |  EPD1   |  COSB   |  Log-If |
+---------------------------------------------------------------------------------------------------------+
| CBR.1     |    225    |   DSB  | 0000002500 | 1000000 | 0800000 | 0600000 | 0800000 | 0000001 | 0000001 |
| VBR-RT.1  |    226    |   DSB  | 0000005000 | 1000000 | 0800000 | 0600000 | 0800000 | 0000002 | 0000002 |
| VBR-RT.2  |    227    |   DSB  | 0000005000 | 1000000 | 0800000 | 0600000 | 0800000 | 0000002 | 0000002 |
| VBR-RT.3  |    228    |   DSB  | 0000005000 | 1000000 | 0800000 | 0600000 | 0800000 | 0000002 | 0000002 |
| VBR-nRT.1 |    229    |   DSB  | 0000025000 | 1000000 | 0800000 | 0600000 | 0800000 | 0000002 | 0000002 |
| VBR-nRT.2 |    230    |   DSB  | 0000025000 | 1000000 | 0800000 | 0600000 | 0800000 | 0000002 | 0000002 |
| VBR-nRT.3 |    231    |   DSB  | 0000025000 | 1000000 | 0800000 | 0600000 | 0800000 | 0000002 | 0000002 |
| UBR.1     |    232    |   DSB  | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 | 0000004 | 0000004 |
| UBR.2     |    233    |   DSB  | 0000050000 | 1000000 | 0800000 | 0600000 | 0800000 | 0000004 | 0000004 |
| ABR       |    234    |   DSB  | 0000050000 | 0200000 | 0800000 | 0600000 | 0800000 | 0000003 | 0000003 |
| CBR.2     |    235    |   DSB  | 0000002500 | 1000000 | 0800000 | 0600000 | 0800000 | 0000001 | 0000001 |
| CBR.3     |    236    |   DSB  | 0000002500 | 1000000 | 0800000 | 0600000 | 0800000 | 0000001 | 0000001 |
+---------------------------------------------------------------------------------------------------------+
```

Card SCT COSB Threshold Parameters (dspcdsct cosThr)

The following report appears when you enter the **dspcdsct cosThr** command:

```
pop20two.10.AXSM.a > dspcdsct cosThr
+-----------------------------------------------------------------------------------------------+
Service Class Template [00002] : COSB Threshold Parameters
+-----------------------------------------------------------------------------------------------+
| COSB |COSB THRESH|  MAX_CELL  |   EFCI  | CLP_HI  |   EPD0  | CLP_LO  |   RED   | RED PROB  |
|      |  TBL IDX  |   THRESH   |         |         |         |  EPD1   |         |  FACTOR   |
+-----------------------------------------------------------------------------------------------+
| 0001 |  0000114  |  1000000   | 0200000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0002 |  0000115  |  1000000   | 0200000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0003 |  0000116  |     5000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0004 |  0000117  |    10000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0005 |  0000118  |    50000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0006 |  0000119  |   100000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0007 |  0000120  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0008 |  0000121  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0009 |  0000122  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0010 |  0000123  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0011 |  0000124  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0012 |  0000125  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0013 |  0000126  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0014 |  0000127  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0015 |  0000128  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
| 0016 |  0000129  |  1000000   | 1000000 | 0800000 | 0600000 | 0800000 | 1000000 | 000000015 |
+-----------------------------------------------------------------------------------------------+
```

Applying a New Version of an SCT to a Card or Port

The major version number of an SCT file changes when a new parameter is added to an SCT, or when an existing parameter in deleted from an SCT. Only Cisco can warrant a major version change to an SCT file. Major version changes are posted in *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)*.

To apply a new major version of an SCT file to a card or port, use the following procedures:

Step 1 Download the new SCT file to your switch, as described in the "Installing SCT Files" section in Appendix A, "Downloading and Installing Software Upgrades."

Step 2 Establish a CLI management session at any user access level.

Step 3 Enter the **cc** command to change to the appropriate card (the card on which you will apply the new SCT). In the following example, the user will be applying a new SCT to an AXSM card:

```
D1.8.PXM.a > cc 2

(session redirected)

D1.2.AXSM.a >
```

Step 4 Enter the **setsctver** <*sctver*> command. Replace <*sctver*> with the new SCT major version number.

```
D1.2.AXSM.a > setsctver 2
```

Step 5 In order for the newer version of the SCT to take effect, you must reset the card. On a redundant pair, enter the **switchredcd** command to reset the card. On a standalone card, enter the **resetcd** command.

Step 6 To verify that the new SCT version has been applied to the appropriate card, enter the **dspcd** command. To verify that a new port SCT has been associated on the appropriate ports, enter the **dspports** command.

Displaying the SCT Checksum

To display the latest SCT checksum number, enter the **dspsctchecksum** command at the appropriate AXSM card as shown in the following example:

Deleting an SCTs your Network

To delete an SCT file from the switch, use the following procedure:

Step 1 Establish a CLI management session at any user access level.

Step 2 At the PXM prompt, enter the **delsct** <*card type*> <*sct type*> <*sctid*> <*major ver*> command, as shown in the following example:

```
D1.8.PXM.a > delsct 1 2 00103 00001
```

Table 7-32 described the parameters for the **delsct** command.

Table 7-32 cnfsct Command Parameters

Option	Description
card type	Identifies the type of card the SCT runs on. The possible card types are as follows: 1: AXSM 2: AXSME 3: PXM (for PXM1E only) 4: HSFR.
type	Determines whether the SCT is a port SCT or a card SCT.
SCT d	Number between 1 and 65335 which identifies an SCT.
major ver	Major version number of a file. This number changes when a new parameter is added to a MIB. Only Cisco can generate a new major version of a file.
checksum	SCT identification number that comes from Cisco and is published in the release notes. The checksum number an be from 1 to 132 characters, but cannot included space characters.
description	Describes the SCT file.

Step 3 Enter the **dspscts** command to ensure that the proper SCT was deleted from your network.

Viewing an ATM Port Configuration

To view the configuration of an ATM line or trunk port, use the following procedure.

Step 1 Establish a CLI management session at any user access level.

Step 2 To display a list of the ports already configured on the AXSM card, enter the following command:

```
mgx8850a.10.AXSM.a > dspports
```

This command displays all configured ports on the AXSM card. Port numbers are listed in the ifNum (interface number) column. The interfaces listed include UNI and NNI ports. Note the number of the port for which you want to view the configuration.

Step 3 To display the port configuration, enter the following command:

```
mgx8850a.10.AXSM.a > dspport <ifNum>
```

Replace *ifNum* with the number assigned to the port during configuration. The following example shows the report for this command:

```
mgx8850a.10.AXSM.a > dspport 2
  Interface Number              : 2
  Line Number                   : 2.1
  Admin State                   : Up        Operational State   : Down
  Guaranteed bandwidth(cells/sec): 100000    Number of partitions: 1
  Maximum bandwidth(cells/sec)  : 100000    Number of SPVC      : 0
  ifType                        : NNI       Number of SVC       : 0
  SCT Id                        : 6
  VPI number(VNNI only)         : 0
```

Managing Partitions

The following sections describe how to display, change, and delete a resource partition.

Displaying a Resource Partition Configuration

To display a list of resource partitions or a resource partition configuration, use the following procedure.

Step 1 Establish a CLI management session at any user access level.

Step 2 To display a list showing the resource partitions on this card, enter the following command:

```
mgx8850a.10.AXSM.a > dspparts
```

The switch displays a report similar to the following:

```
mgx8850a.10.AXSM.a > dspparts
if  part Ctlr egr     egr     ingr    ingr    min max   min   max  min   max
Num ID   ID   GuarBw  MaxBw   GuarBw  MaxBw   vpi vpi   vci   vci  conn  conn
             (.0001%)(.0001%)(.0001%)(.0001%)
----------------------------------------------------------------------------
 1   1     2 1000000 1000000 1000000 1000000    0 4095    52 65535  10000  10000
 2   1     2 1000000 1000000 1000000 1000000    0  255    52 65535   5000   5000
```

Step 3 To display the configuration of a resource partition, note the interface and partition numbers and enter the following command:

```
mgx8850a.10.AXSM.a > dsppart <ifNum> <partId>
```

Replace *ifnum* with the interface number of the port, and replace *partitionID* with the partition number assigned to the port. The following example shows the report provided by the **dsppart** command.

```
pop20one.10.AXSM.a > dsppart 1 1
  Interface Number               : 1
  Partition Id                   : 1        Number of SPVC: 0
  Controller Id                  : 2        Number of SPVP: 0
  egr Guaranteed bw(.0001percent): 1000000  Number of SVC : 2
  egr Maximum bw(.0001percent)   : 1000000
  ing Guaranteed bw(.0001percent): 1000000
  ing Maximum bw(.0001percent)   : 1000000
  min vpi                        : 0
  max vpi                        : 4095
  min vci                        : 32
  max vci                        : 65535
  guaranteed connections         : 10000
  maximum connections            : 10000
```

Note Partition ID 1 is reserved for PNNI.

To display the current level of usage of various parameters on a partition, enter the **dspload** command at the appropriate AXSM prompt:

```
mgx8850a.10.AXSM.a > dspload <ifNum> <partId>
```

Replace *<ifNum>* with the appropriate port number. Replace *<partId>* with the partition identifier. The display shows the configured bandwidth and connection numbers and what has actually been utilized.

The following example displays the load on partition number 1 on logical port 1:

```
M8850_NY.1.AXSM.a > dspload 1 1

        +-------------------------------------------+
        |   I N T E R F A C E    L O A D   I N F O  |
        +-------------------------------------------+
        | Maximum Channels          : 0002000       |
        | Guaranteed Channels       : 0001000       |
        | Igr Maximum Bandwidth     : 1412830       |
        | Igr Guaranteed Bandwidth  : 0706415       |
        | Egr Maximum Bandwidth     : 1412830       |
        | Egr Guaranteed Bandwidth  : 0706415       |
        | Available Igr Channels    : 0001998       |
        | Available Egr Channels    : 0001998       |
        | Available Igr Bandwidth   : 1410377       |
        | Available Egr Bandwidth   : 1410377       |
        +-------------------------------------------+
        |          E X C E P T -- V A L U E S       |
        +-------------------------------------------+
        | SERV-CATEG | VAR-TYPE | INGRESS | EGRESS  |
        | VSI-SIG    | Avl Chnl | 0001998 | 0001998 |
        | CBR        | Avl Chnl | 0001990 | 0001990 |
        | VBR-RT     | Avl Chnl | 0001990 | 0001990 |
        | VBR-nRT    | Avl Chnl | 0001990 | 0001990 |
        | UBR        | Avl Chnl | 0001990 | 0001990 |
        | ABR        | Avl Chnl | 0001990 | 0001990 |
        +-------------------------------------------+
        | VSI-SIG    | Avl Bw   | 1410377 | 1410377 |
        | CBR        | Avl Bw   | 1410377 | 1410377 |
        | VBR-RT     | Avl Bw   | 1410377 | 1410377 |
```

```
| VBR-nRT    | Avl Bw    | 1410377  | 1410377 |
| UBR        | Avl Bw    | 1410377  | 1410377 |
| ABR        | Avl Bw    | 1410377  | 1410377 |
+-----------------------------------------+

M8850_NY.1.AXSM.a >
```

Note If necessary, use the **dspparts** command to see existing partition numbers.

Changing a Resource Partition Configuration

To change the configuration of a resource partition, use the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 To display a list showing the partitions for this card, enter the **dspparts** command.

Note You can change a resource partition only when the partition is not in use.

Step 3 To create a resource partition, enter the following command:

```
mgx8850a.10.AXSM.a > cnfpart -if <ifNum> -id <partId> -emin <egrminbw> -emax <egrmaxbw>
-imin <ingminbw> -imax <ingmaxbw> -vpmin <minVpi> -vpmax <maxVpi> -vcmin <minVci> -vcmax
<maxVci> -mincon <minConns> -maxcon <maxConns>
```

Table 7-33 describes the parameters for this command.

Table 7-33 Parameters for the cnfpart Command

Parameter	Description
ifNum	Interface number or port number. This number identifies the port this resource partition configures. Enter the interface number that was assigned to the port when it was configured (See the "Adding ATM Ports" section in Chapter 6, "Provisioning AXSM Communication Links.").
partId	Partition identification number. Enter a number in the range of 1 to 20. Partition ID 1 is reserved for PNNI. On an AXSM card, this number must be the same for all ports that use the PNNI controller.
egrminbw	Egress minimum bandwidth. Enter the minimum percentage of the outgoing port bandwidth that you want assigned to the specified controller. One percent is equal to 0.00001 units. For example, an <*egrminbw*> of 250000 = 25%. The sum of the minimum egress bandwidth settings for PNNI and MPLS must be 100% or less, and must be less than the sum of the egrmaxbw settings.
egrmaxbw	Egress maximum bandwidth. Enter the maximum percentage of the outgoing port bandwidth that you want assigned to the controller. One percent is equal to 0.00001 units. For example, an <*egrmaxbw*> of 1000000 = 100%. The sum of the maximum egress bandwidth settings for PNNI and MPLS can exceed 100%, and must be more than the sum of the egrminbw settings. Available bandwidth above the minimum bandwidth settings is allocated to the operating controllers on a first-request, first-served basis until the maximum bandwidth setting is met or there is insufficient bandwidth to meet the request.

Table 7-33 Parameters for the cnfpart Command (continued)

Parameter	Description
ingminbw	Ingress minimum bandwidth. Enter the minimum percentage of the incoming port bandwidth that you want assigned to the controller. One percent is equal to 0.00001 units. For example, an <*ingminbw*> of 500000 = 50%. The sum of the minimum ingress bandwidth settings for PNNI and MPLS must be 100% or less, and must be less than the sum of the ingmaxbw settings.
ingmaxbw	Ingress maximum bandwidth. Enter the maximum percentage of the incoming port bandwidth that you want assigned to the controller. One percent is equal to 0.00001 units. For example, an <*ingmaxbw*> of 750000 = 75%. The sum of the maximum ingress bandwidth settings for PNNI and MPLS can exceed 100%, and must be more than the sum of the ingminbw settings. Available bandwidth above the minimum bandwidth settings is allocated to the operating controllers on a first-request, first-served basis until the maximum bandwidth setting is met or there is insufficient bandwidth to meet the request.
minVpi	Minimum VPI number for this port. For UNI ports, enter a value in the range from 0 to 255. For NNI ports, enter a value in the range from 0 to 4095.
maxVpi	Maximum VPI number for this port. For UNI ports, enter a value in the range from 0 to 255. For NNI ports, enter a value in the range from 0 to 4095. The value for <*maxVpi*> cannot be less than for <*minVpi*>.
minVci	Minimum VCI number for this port. For OC-48 AXSM cards, enter a number in the range from 32 to 131072. For all other cards, enter a number in the range from 32 to 65535. To support features planned for the future, Cisco recommends setting the minimum VCI to 35 or higher.
maxVci	Maximum VCI number for this port. For OC-48 AXSM cards, enter a number in the range from 32 to 131072. For all other cards, enter a number in the range from 32 to 65535.
minConns	Minimum number of simultaneous connections allowed on this port. The minimum number of connections is 0. The type of back card and line determine the maximum number of connections as follows: T3/E3 lines: 65535 per line to a total of 65535 per back card OC3 lines: 32767 per line to a total of 65535 per back card OC12 lines: 32767 per line to a total of 65535 per back card OC48 lines: 131071 per line to a total of 131071 per back card Note that the maximum number of connections is 128K (131,071) for the AXSM front card and the OC48 back card. For the other AXSM back cards, which are used in pairs (upper and lower bays), the maximum number of connections is 64K (65535), which totals 128K for the front card.
maxConns	Maximum number of simultaneous connections allowed on this port. The range is the same as described for the <*minConns*> parameter, and this parameter must be set to number that is greater than the number defined for <*minConns*>.

Step 4 To display the changed partition configuration, enter the **dsppart** command as described in the previous section.

Note The current software release does not support dynamic changes to partitions. To begin using changes to a resource partition, you need to delete the controller and then add the controller as described in the rest of this procedure.

Step 5 Display the available controllers with the **dspcontrollers** command, and write down the controller settings for the controller you are about to delete. For example:

```
pop20two.7.PXM.a > dspcontrollers
pop20two                         System Rev: 02.01   Feb. 08, 2001 19:10:33 PST
MGX8850                                              Node Alarm: NONE
Number of Controllers:        2
Controller Name:              PNNI Controller
Controller Id:                2
Controller Location:          Internal
Controller Type:              PNNI
Controller Logical Slot:      7
Controller Bay Number:        0
Controller Line Number:       0
Controller VPI:               0
Controller VCI:               0
Controller In Alarm:          NO
Controller Error:

Controller Name:              MPLS Controller
Controller Id:                3
Controller Location:          Internal
Controller Type:              LSC
Controller Logical Slot:      7
Controller Bay Number:        0
Controller Line Number:       0

Type <CR> to continue, Q<CR> to stop:
pop20two                         System Rev: 02.01   Feb. 08, 2001 19:10:33 PST
MGX8850                                              Node Alarm: NONE
Controller VPI:               0
Controller VCI:               0
Controller In Alarm:          NO
Controller Error:
```

Step 6 Enter the **delcontroller** command to delete the controller that corresponds to the resource partition you modified. For example:

```
pop20two.7.PXM.a > delcontroller 3
All Ports and Connections
        on this controller will be deleted.
delcontroller: Do you want to proceed (Yes/No)? y
```

Step 7 To register the resource partition changes, add the deleted controller with the **addcontroller** command. For example:

```
pop20two.7.PXM.a > addcontroller 3 i 3 7 "MPLS Controller"
```

Step 8 To verify that the controller was added correctly, enter the **dspcontrollers** command.

To add an MPLS partition on port which has a minimum VCI value of 32, perform one of the following options:

- Add the MPLS controller, and then add the TDP sig vc using a VPI/VCI pair within its partition's range.
- Enter the **dnport** and **cnfpart** commands to change the minimum VCI to 35 for all partitions on the port.

Deleting a Resource Partition

To delete a resource partition, you must do the following:

- Delete any connections that are using the affected port
- Bring down the affected port

The following procedure explains how to delete a resource partition.

Step 1 Establish a configuration session using a user name with CISCO_GP privileges.

Step 2 To display a list showing the partitions for this card, enter the **dspparts** command.

Step 3 Note the interface number and partition number for the resource partition you want to delete.

Step 4 To display the active connections, enter the following command:

```
mgx8850a.10.AXSM.a > dspcons
```

The following is a sample **dspcons** display.

```
pop20one.7.PXM.a > dspcons

Local Port         Vpi.Vci   Remote Port        Vpi.Vci    State   Owner
----------------------------+-----------------------------+-------+------
10:2.2:2          100 100    Routed            100 100     FAIL        MASTER
Local  Addr: 47.00918100000000107b65f33c.0000010a1802.00
Remote Addr: 47.009181000000002a123f213f.000001011802.00\\
```

Step 5 Review the **dspcons** command display to see if the interface to which the partition is assigned is being used by a connection. The Identifier column identifies the interface, VPI, and VCI for the connection in the format: *if.VPI.VCI*. If the interface is in use, note the VPI and VCI values of all connections that use the interface. You will need these to delete the connections.

Step 6 Delete each connection that uses the interface by entering the following command:

```
mgx8850a.10.AXSM.a > delcon <ifNum> <VPI> <VCI>
```

Step 7 Bring down the interface by entering the following command:

```
mgx8850a.10.AXSM.a > dnport <ifNum>
```

Step 8 Delete the resource partition by entering the following command:

```
mgx8850a.10.AXSM.a > delpart <ifNum> <partId>
```

Replace <*ifNum*> with the interface number of the port, and replace <*partitionId*> with the partition number assigned to the port.

Step 9 To verify that the partition has been deleted, enter the **dspparts** command to display a list of partitions for the card.

Removing Static ATM Addresses

If you create a static ATM address and later want to remove that address, use the following procedure to delete it.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 To locate the port for which you want to delete an address, enter the **dsppnports** command.

Step 3 Use the following command to delete the static address:

```
popeye2.7.PXM.a > deladdr <portid> <atm-address> <length> [-plan {e164|nsap}]
```

The command parameters are described in Table 7-34.

Table 7-34 ATM Address Configuration Parameters

Parameter	Description
portid	Port identifier in the format slot:bay.line:ifnum. These parameters are described in Table 7-1.
atm-address	Enter the ATM address using up to 40 nibbles. The ATM address can include up to 20 bytes, which is 40 nibbles or 160 bits.
length	Enter the length, in bits, of the address you specified with the <*atm-address*> parameter. Each nibble is equal to 4 bits. The acceptable range for the parameter is from 0 to 160 bits.
-plan	Enter the address plan, which is either **e164** (E.164) or **nsap** (NSAP). For an NSAP address, the first byte of the address automatically implies one of the three NSAP address plans: NSAP E.164, NSAP DCC, or NSAP ICD. Default = **nsap**.

Step 4 To verify that the static address has been deleted, enter the following command:

```
popeye2.7.PXM.a > dspatmaddr <portid>
```

Replace <*portid*> with the port address using the format *slot*:*bay.line*:*ifnum.* These parameters are described in Table 7-1.

Configuring VPI and VCI Ranges for SVCs and SPVCs

When you add a partition to a port, you define the minimum and maximum VPIs and VCIs for that port. These VPIs and VCIs become available for all services unless you make additional configuration changes. If this configuration is acceptable for your installation, you can skip this section. You are not required to configure VPI and VCI ranges for SVCs and SPVCs.

The Cisco MGX 8850 and Cisco MGX 8950 switches allow you to define the minimum and maximum values for the following connections:

- SVCC VPIs
- SVCC VCIs
- SPVC VPIs

To configure VPI and VCI usage for connections on a specific port, use the following procedure.

Step 1 Establish a configuration session using a user name with GROUP1 privileges or higher.

Step 2 To display a list of PNNI ports, enter the **dsppnports** command.

Step 3 Use the following command to bring down the PNNI port you want to configure:

```
popeye2.7.PXM.a > dnpnport <portid>
```

A PNNI port is automatically brought up when you add it. You must bring down the port before you can change the port range. Replace <*portid*> using the format slot:bay.line:ifNum. Table 7-1 describes these parameters.

Step 4 To configure the port range, enter the following command:

```
popeye2.7.PXM.a > cnfpnportrange <portid> [-minsvccvpi <min-svcc-vpi>] [-maxsvccvpi
<max-svcc-vpi>]] [-minsvccvci <min-svcc-vci>] [-maxsvccvci <max-svcc-vci>]] [-minsvpcvpi
<min-svpc-vpi>] [-maxsvpcvpi <max-svpc-vpi>]]
```

The only required parameter for this command is the <*portid*> parameter, but the command serves no purpose if you enter it without options. If you include some options with the command and omit others, the omitted options remain set to the last configured values. Table 7-35 lists and describes the options and parameters for this command.

Table 7-35 Parameters for the cnfpnportrange Command

Parameter	Description
portid	Port identifier in the format slot:bay.line:ifnum. Table 7-1 describes these parameters.
min-svcc-vpi	Minimum VPI value for SVCC. Range: 0 to 4095. Default = **0**.
max-svcc-vpi	Maximum VPI value for SVCC. Range: 0 to 4095. Default = **4095**.
min-svcc-vci	Minimum VCI value for SVCC. Range: 32 to 65535. Default = **35**.
max-svcc-vci	Maximum VCI value for SVCC. Range: 32 to 65535. Default = **65535**.

Table 7-35 Parameters for the cnfpnportrange Command (continued)

Parameter	Description
min-svpc-vpi	Minimum VPI value for SVPC. Range: 1 to 4095. Default = **1**.
max-svpc-vpi	Maximum VPI value for SVPC. Range: 1 to 4095. Default = **4095**.

Step 5 Enter the **uppnport** command to bring up the PNNI port you just configured.

```
pop20two.8.PXM.a > dsppnportrange <portid>
```

Replace <*portid*> using the formate slot:bay.line:ifNum. Table 8-1 describes these parameters.

Step 6 To display the PNNI port range for a port, enter the dsppnportrange <portid> command.

```
pop20two.8.PXM.a > dsppnportrange 1:2.1:2
```

After you enter the command, the switch displays a report similar to the following example:

```
minSvccVpi:          0             maxSvccVpi:      4095
minSvccVci:         35             maxSvccVci:     65535
minSvpcVpi:          1             maxSvpcVpi:      4095
```

Managing Priority Routing

When an SPVC is created, it can be prioritized so that the user has more control over the sequence in which connections are routed, rerouted, and de-routed in the network. Routing priorities are set in a range from 0 through 15, with 0 being the highest priority and 15 being the lowest priority. 0 priority is reserved for networking control connections, while priorities 1 through 15 can be assigned to user connections.

Within the priority categories of 0 through15, connections are further divided into groups based on their bandwidth. Connections requiring more bandwidth are routed before those requiring less bandwidth. The number of bandwidth groups is fixed at 50, but you can specify the following:

- The range with the lowest bandwidth requirement
- The range of cells per second in each range between the highest and lowest ranges.

Because the bandwidth groups are node-level, they apply to all priorities: the same ranges exist for priority 0, priority 1, priority 2, and so on down to the lowest priority. Connections requiring the least bandwidth are grouped at the low end of the range, and connections requiring the most bandwidth are grouped at the top end of the range. The remaining connections are progressively grouped somewhere between the upper and lower bounds.

Bandwidth for a priority is divided into three parts:

- The lowest range: you determine the lowest range by specifying the highest rate within the range. For example, if you type 3000, the lowest range is 0–3000 cps.
- The highest range: the highest range is what is left over after you specify the *lowest* range, the *number* of bandwidth groups, and the number of *cells per second* in each bandwidth increment.
- All incremental ranges between the lowest and the highest.

Note The de-routing of SVCs uses the same priority routing criteria.

Before you can prioritize a specific SPVC, you must set up the priority routing feature on the node itself, as described in the section that follows.

Establishing Priority Routing on a Node

Priority routing is established on a node through the **cnfpri-routing** command at the PXM card.

```
SES.1.PXM.a > cnfpri-routing [-bwstart <start>] [-bwincr <incr>][-pribuf <time>] [-nodebuf <delay>]
```

Table 7-36 describes the options available in the **cnfpri-routing** command.

Table 7-36 cnfpri-routing Command Options

Parameter	Description
-bwstart	The value for bwstart is the highest cell rate in the lowest-speed bandwidth group. The number of bandwidth groups is fixed at 50.” Range: 1-500000 Default: 5000
-bwincr	The increment for the cell rate between the upper and lower bounds of each intermediate bandwidth group. For example, an increment of 2000 means that a range starting at 10000 cps ends at 12000 cps. This increment does not apply to the following: • The group with the lowest bandwidth requirements: for this group, the range is determined by the value for **bwstart**. • The group with the highest bandwidth requirements: for this group, the range is what remains after computations based on the following: – The value for **bwstart** – The value for **bwincr** Range: 1–500000 Default: 1000

Table 7-36 cnfpri-routing Command Options (continued)

Parameter	Description
-pribuf	The priority buffer is a time counter. It counts down to the moment when PNNI prioritizes all buffered connections for routing. A connection is buffered due to an event that causes PNNI to re-route the connection. The routing events are as follows: • An interface with a master endpoint comes up. • A routed SPVC or SPVP is released (or failed). • An SPVC or SPVP is created. • Route optimization begins. Range: 0–600, in units of 0.1 seconds (0–60 seconds) Default: 0
-nodebuf	The node buffer is a time counter. It counts down the time to wait before PNNI starts routing connections. Down-counting begins when the first PNNI logical port comes up. The buffer operates once, after node start-up or node reset. Range: 0-3000, measured in units of 0.1 seconds (0–300 seconds) Default: 0

Configuring Priority Routing on a Connection

Once priority routing has been set up on a node, you can prioritize the node's SPVCs. A connection's priority is designated during the SPVC master end setup with the **addcon** command. (See the "Configuring the Master Side of SPVCs and SPVPs" section in Chapter 6, "Provisioning AXSM Communication Links.").

The following command example defines a port as the master side of an SPVC with a routing priority of 3.

```
pop20one.10.AXSM.a > addcon 3 101 101 1 1 -slave -rtngprio 3
47009181000000000001A531C2A00000101180300.101.101
master endpoint added successfully
master endpoint id : 47009181000000000107B65F33C0000010A180300.101.101
```

Note If you are setting up priority routing on a node that already has established SPVCs, their routing priority is set to 8 by default. You can change the routing priority on an established connection with the **cnfcon** command. (See the next section"Modifying SPVC Priority Routing Configuration")

Modifying SPVC Priority Routing Configuration

Enter the **cnfcon** command and use the -*rtngprio* option to change an SPVC's routing priority, as shown in the following example:

```
pop20one.10.AXSM.a > cnfcon 3 101 101 -rtngprio 6
```

Tracing Established Connections

Release 3 of the MGX switches supports a path and connection trace feature which allows you to view details about established connections and their paths on your network. This feature provides valuable information for monitoring and troubleshooting your network.

- The highest range: the highest range is what is left over after you specify the *lowest* range, the *number* of bandwidth groups, and the number of *cells per second* in each bandwidth increment.
- All incremental ranges between the lowest and the highest.

Note The derouting of SVCs uses the same priority routing criteria.

Before you can prioritize a specific SPVC, you must set up the priority routing feature on the node itself, as described in the section that follows.

Setting and Viewing the Path Trace Feature on the Node

The Path trace feature is enabled on the switch by default. To disable path trace feature at the node level, enter the **pathtracenode** *disable* command at the active PXM45, as shown in the following example:

```
popeye2.7.PXM.a > pathtracenode disable
```

To enable the path trace feature at the node level after it has been disabled, enter the **pathtracenode** *enable* command at the active PXM45, as showing in the following example:

```
popeye2.7.PXM.a > pathtracenode enable
```

To view the current setting of the nodal path trace, enter the **dsppathtracenode** *enable* command at the active PXM45, as showing in the following example:

```
popeye2.7.PXM.a > dsppathtracenode
dsppathtracenode: enable (1)
```

Setting and Viewing the Path Trace Feature on a Port

To enable or disable path trace feature at port level, enter the **pathtraceport** <*portid*> <*options*> command. The result of a path trace is saved in a log file.

```
pathtraceport <portid> {enable|disable} [-H {on | off}] [-CB {on | off}] [-V {on | off}]
[-CR {on | off}] [-cldnum called-AESA] [-clgnum calling-AESA]
```

Table 7-37 describes the **pathtraceport** command options.

Table 7-37 pathtraceport Command Options

Command	Description
portid	Identifies a PNNI physical port, in the format slot:subslot.port:subport.
enable or disable	Enables (disables) path trace at port level.
-H	Specifies the hierarchy option. If enabled, information from all the DTLs in the hierarchy are added in the TTL IE. Default: off
-CB	Specifies the crankback option. If enabled, the failure cause for crankback is included in the TTL IE. Default: on
-V	Specifies the VPI/VCI option. If enabled, VPI/VCI values of the egress port are added in the TTL IE at every node. Default: off
-CR	Specifies the call reference option. If enabled, call reference values of all egress ports are added in the TTL IE. Default: off
-cldnum	Specifies the called party number. Enables/disables path trace on a specific called address.
-clgnum	Specifies the calling party number. Enables/disables path trace on a specific calling address

To view the port configuration for the path and connection trace, enter the **dsppathtraceport** <*portid*> command at the active PXM45 prompt, as shown in the following example:

```
M8850_LA.8.PXM.a > dsppathtraceport 3:1.1:1
port 3:1.1:1

Port option    : off
Clear          : off
Crankback      : off
VPI/VCI        : on
Call Reference : on
Calling address: none
Called address : none

M8850_LA.8.PXM.a > (command aborted)
```

To view an established connection, enter the **conntrace** <*portid*> <*options*> command at the active PXM45 switch prompt. The are two ways to enter the conntrace command:

```
M8850_SF.7.PXM.a > conntrace <portid> {-callRef <callRef> [-endptRef <endptRef>]
[-callref-flag <flag>]}
```

or

```
M8850_SF.7.PXM.a > conntrace <portid> {-vpi <vpi> -vci <vci>}
```

Table 7-38 describes the **conntrace** command options.

Table 7-38 conntrace Command Options

Command	Description
portid	Identifies a PNNI physical port, in the format slot:subslot.port:subport.
callRef	Provides a call reference by itself to trace the connection. A call reference by itself identifies Range for callRef: 1-16777215
endptRef	If you provide a call reference, you can also provide an endpoint reference for a point-to-multipoint (P2MP) call. **Note** This release does not support P2MP calls. Range for endptRef:1-32767
vpi	VPI, which depends on whether the connection is a virtual path connection or a virtual channel connection, in the range from 1 through 4095.
vci	VCI, in the range from 0 through 65355.
flag	Flags the call trace so that it will be based on a call reference. Enter a 1 if to flag the call. Enter a 0 if you want to disabled the call reference flag on the current trace. Default: 0

Displaying Path Trace Information

There are several commands that allow you to display trace information about a connection. By entering these commands at the slave end of the connection, you can determine the path taken by a connection. Table 7-39 describes these commands.

Table 7-39 Path and Connection Trace Commands

Command	Description
dsppathtracenode *<enable|disable>*	Displays the nodal configuration for the path and connection trace.
dsppathtraceport *<portid>*	Displays the port configuration for the path and connection trace.
dsppathtraceie *<portid>*	Displays whether or not TTL 1E is included in the specified port's configuration.
dsppathtracebuffer *<portid><vpi><vci>*	Displays a specific connection based on the physical port id, vpi, and vci.
dsppathtracebuffer	Displays all path traces in all the path trace buffers.

Clearing Path and ConnectionTraces

All path and connection traces are stored in a buffer. To clear a connection traces, you need to delete it from the connection or path trace buffer.

Clear the Connection Trace Buffer

Use the following procedure to clear a specific connection trace:

Step 1 Enter the **dspconntracebuffers** command at the active PXM45 to view all path traces in the path trace buffer, as shown in the following example:

```
M8850_SF.7.PXM.a > dspconntracebuffers
```

Step 2 Enter the **clrconntracebuffer** <*portid*> <*vpi*> <*vci*> command to clear the specific connection trace. Replace <*portid*> the physical ports id, in the format slot:subslot.port:subport. Replace <*vpi*> with the port's VPI, in the range from 1 through 4095. Replace <*vci*> with port's VCI, in the range from 0 through 65355.

```
clrconntracebuffers 3:1.1:1 -vpi 102 -vci 102
```

Step 3 Enter the **dspconntracebuffer** <*portid*> <*vpi*> <*vci*> command to ensure that the specified path trace buffer is clear. Replace <*portid*> the physical ports id, in the format slot:subslot.port:subport. Replace <*vpi*> with the port's VPI, in the range from 1 through 4095. Replace <*vci*> with port's VCI, in the range from 0 through 65355.

```
M8850_SF.7.PXM.a > dspconntracebuffer 3:1.1:1 -vpi 102 -vci 102

M8850_SF.7.PXM.a >
```

To clear all connection traces in the connection trace buffer, enter the **clrconntracebuffers** command at the active PXM45, as shown in the following example.

```
M8850_SF.7.PXM.a > clrconntracebuffers
```

Clear the Path Trace Buffer

Use the following procedure to clear a specific path trace:

Step 1 Enter the **dsppathtracebuffers** command at the active PXM45 to view all path traces in the path trace buffer, as shown in the following example:

```
M8850_SF.7.PXM.a > dsppathtracebuffers
```

Step 2 Enter the **clrpathtracebuffer** <*portid*> <*vpi*> <*vci*> command to clear a specified path trace. Replace <*portid*> the physical ports id, in the format slot:subslot.port:subport. Replace <*vpi*> with the port's VPI, in the range from 1 through 4095. Replace <*vci*> with port's VCI, in the range from 0 through 65355.

```
M8850_SF.7.PXM.a > clrpathtracebuffer 3:1.1:1 -vpi 102 -vci 102
```

Step 3 Enter the **dsppathtracebuffer** <*portid*> <*vpi*> <*vci*> command to ensure that the specified path trace buffer is clear. Replace <*portid*> the physical ports id, in the format slot:subslot.port:subport. Replace <*vpi*> with the port's VPI, in the range from 1 through 4095. Replace <*vci*> with port's VCI, in the range from 0 through 65355.

```
M8850_SF.7.PXM.a > dsppathtracebuffer 3:1.1:1 -vpi 102 -vci 102

M8850_SF.7.PXM.a >
```

To clear all connection traces in the path trace buffer, enter the **clrpathtracebuffers** command at the active PXM45, as shown in the following example.

```
M8850_SF.7.PXM.a > clrpathtracebuffers
```

Clearing a Call at the Destination Node

When a call setup message reaches its destination, you can ensure that the call is cleared by entering the **pathtraceport** command as follows:

pop20two.7.PXM.a > **pathtraceport** <portid> -X

Replace *portid* using the format *slot*:*bay.line*:*ifNum*. Table 7-1 describes these parameters. The -X parameter ensures that calls will be cleared once they reach the destination specified in the *portid* parameter.

Managing Load Sharing

When redundant PXM45 cards are used, load sharing enables traffic routing through the switch fabric on both PXM45 cards, doubling the capacity of the switch. Load sharing is enabled by default and should only be disabled for testing or debugging purposes.

The switch provides two options for load sharing management: Auto Shutdown and Plane Alarm Threshold. The switch fabric on each PXM45 is made up of 3-switch planes that each contain links to 14 slots within the switch chassis. When the Auto Shutdown feature is enabled and one of these internal links fails, that link is automatically shut down, and the card in the affected slot must use a link to another switch plane. If Auto Shutdown is not enabled and a link goes bad, the affected card slot can still attempt to use that link.

The Plane Alarm Threshold option defines the threshold at which a switch plane is declared bad and reported as such. When a switch plane is reported bad, the PXM45 on which the switch plan resides should be replaced.

The following procedures describe how to view the load sharing option settings and how to change them.

Displaying Load Sharing Status

To display whether the status of the load sharing options, enter the **dspxbarmgmt** command. The following example shows the display for this command.

```
pop20two.7.PXM.a > dspxbarmgmt
pop20two                         System Rev: 02.01   Dec. 07, 2000 18:36:47 GMT
MGX8850                                              Node Alarm: MAJOR
Load Sharing: Enable
Auto Shutdown: Disable
Plane Alarm Threshold: 3
```

The Load Sharing and Auto Shutdown lines shows the option status as Enable or Disable. The Plane Alarm Threshold line displays a number from 1 to 32. On PXM45 cards, the maximum number of slots to which each plane can connect is 14.

Changing Load Sharing Options

To change the load sharing options, enter the **cnfxbarmgmt** command as described in the following procedure.

Step 1 Establish a configuration session using a user name with SUPER_GP privileges or higher.

Step 2 Display the current configuration setting by entering the **dspxbarmgmt** command.

Step 3 Set the load sharing options by entering the **cnfxbarmgmt** command as follows:

```
pop20two.7.PXM.a > cnfxbarmgmt <loadSharing> <autoShutdown> <planeAlarmThresh>
```

Note You must enter values for all command parameters, even if you want to change only one of them.

Table 7-40 describes the parameters for this command.

Table 7-40 Command Parameters for cnfxbarmgmt

Parameter	Description
loadSharing	Enables or disables load sharing. Enter **-1**, **0**, or **1**. These values control load sharing as follows: • **-1** unconditionally disables load sharing, regardless of switch plane status • **0** disables load sharing only when there are no switch plane alarms • **1** enables load sharing If you do not want to change the setting, enter the value that corresponds to the current setting displayed with the **dspxbarmgmt** command.
autoShutdown	Enables or disables the Auto Shutdown feature. Enter **0** to disable this feature, or enter **1** to automatically shut down a failed link between a switch plane and a card slot. If you do not want to change the setting, enter the value that corresponds to the current setting displayed with the **dspxbarmgmt** command.
planeAlarmThresh	Defines when a switch plane should be reported as bad. Set the threshold to the number of failed links (between a switch plane and the card slots it services) that exceeds your acceptable limit. The default threshold is **3**. The PXM45 card supports up to 14 links. If you do not want to change the setting, enter the value that appears when you enter the **dspxbarmgmt** command.

Step 4 To verify your configuration change, enter the **dspxbarmgmt** command.

Starting and Managing Telnet Sessions to Other Switches

The Cisco MGX 8850 and Cisco MGX 8950 switches support Telnet sessions between switches. For example, you can start a CLI session with one switch, Telnet to a second switch to view configuration information, then switch back to the first switch and continue that CLI session. Each switch supports up to
15 simultaneous Telnet sessions, and you can Telnet across multiple switches. For example, you can establish a CLI session on switch A, Telnet to switch B, and then Telnet from switch B to switch C.

The following sections describe:

- Starting a Telnet Session
- Returning to a Previous Session
- Returning to the Original CLI Session
- Displaying a Telnet Trace

Starting a Telnet Session

To start a Telnet session, enter the **telnet** command as follows:

```
pop20one.7.PXM.a > telnet [-E<escapeCharacter>] [-R<tracerouteCharacter>] <ipAddress>
[[0x|X|x]<tcpPort>]
```

You must enter an IP address with the **telnet** command as shown in the following example:

```
pop20one.7.PXM.a > telnet 172.29.52.88
Trying 172.29.52.88...
Connected to 172.29.52.88

Login: cisco
password:
```

The -E option allows you to specify an escape character that takes you back to the previous session. For example, if you have Telnetted from Switch A to Switch B to Switch C, you can use this escape character to return to Switch B. The default escape character is Q. To change this, specify an alternate escape character with the -E option when you start a Telnet session. There should be no space character between the -E and the escape character.

The -R option allows you to specify an escape character that displays a trace of your Telnet activity. For example, if you have Telnetted from Switch A to Switch B to Switch C, you can use this escape character to display the Telnet routes from A to B and from B to C. The default escape character is g. To change this, specify an alternate escape character withe the -R option when you start a Telnet session. There should be no space character between the -R and the escape character.

The tcpPort option allows you to specify a destination port for the Telnet session. If you omit this option, the Telnet session uses the default Telnet port.

Returning to a Previous Session

After you Telnet from one switch to another, enter the **bye** command or the **exit** command to close the current session and return to the previous session. For example, if you Telnet from Switch A to Switch B to Switch C, the **bye** command terminates the session on Switch C and displays the session on Switch B.

Returning to the Original CLI Session

After you Telnet from switch to switch, enter the escape character to close all Telnet sessions and return to the original CLI session. The default escape sequence is **Escape, Q** (uppercase Q). Press the **Escape** key first, then press **Shift-Q**. If you specified an alternate escape character when opening Telnet sessions, enter that character in place of Q.

For example, if you Telnet from Switch A to Switch B to Switch C, the escape character sequence closes the Telnet sessions on Switches B and C, and displays the CLI session on Switch A.

Displaying a Telnet Trace

After you Telnet from switch to switch, enter the trace escape character to display a list of connections you have established between switches. The default escape sequence is **Escape, g** (lowercase g). Press the **Escape** key first, then press **g**. If you specified an alternate escape character when opening Telnet sessions, enter that character in place of g.

The following example shows a sequence of Telnet sessions and the trace that documents the sequence:

```
pop20one.7.PXM.a > telnet 172.29.52.88
Trying 172.29.52.88...
Connected to 172.29.52.88

Login: cisco
password:

pop20two.7.PXM.a > telnet 172.29.52.56
Trying 172.29.52.56...

Connected to 172.29.52.56

Login:
password:

pop20one.7.PXM.a >
-> local IP 172.29.52.56, next hop at 172.29.52.88

-> local IP 172.29.52.88, connected to server at 172.29.52.56

pop20two.7.PXM.a >
```

Verifying PXM45 Disk Data

When a failure occurs before a write is complete, the data on the active and standby hard disk may not match.

Enter the **verifydiskdb check** [*-l <level>] [-s <slot>] [-p <pass>*] command at the active PXM45 to run the disk verification utility. Table 7-41 describes the possible options for the **verifydiskdb check** command.

Note Cisco recommends that you run the disk verification utility during a time when there is the least activity on the switch.

Table 7-41 verifydiskdb Command options

Parameter	Description
slot	Slot number of the card on which you want to run the disk verification task.
level	Level on verification for the current task. The levels of verification are as follows: 1 = control information 2 = actual data Default = 2
pass	Number of times the verification utility will pass through the disk if a discrepancy is found. Multiple passes create the opportunity for software to resolve discrepancies. The number of passes rangers from 1 through 10. **Note** If no discrepancies are found, the verification utility runs through the disk only once. Default = 3

If you enter **verifydiskdb check** without any options, the verification utility verifies that the data on the active hard disk matches the data on the standby hard disk. In the following example, the user runs the verification utility for all cards in the node.

```
pop20two.7.PXM.a > verifydiskdb check

pop20two.7.PXM.a >
```

Enter **verifydiskdb check** with the -sl <*slot number*> option to run the verification utility only on the specified slot.

In the following example, the user configures the verification utility to check for any discrepancies in the control information on the card in slot 7. If any discrepancy is found, the verification utility will run through the disk up to 3 times before it finishes.

```
pop20two.7.PXM.a > verifydiskdb check -l 1 -sl 7 -p 3
```

The disk verification task runs in the background until completion. It can take a few seconds or several hours for the disk verification task to finish, depending on your switch configuration. The more connections configured on the switch, the longer takes the utility to complete disk verification . To view the progress of the disk verification task, enter the **verifydiskdb status** command while the verification task is running.

```
pop20two.7.PXM.a > verifydiskdb status


Verification is currently running with the following parameters:
Request: Slot(s): ALL Level: 1   Passes: 3

Current Status
Slot: 7, Databases: 13 Tables 88
DB Index: 12    DB Name: spvcRed
Table Details:
Table Index: 81    Table Name: Disk_spvc_pep_db19
Total Records: 10000   Records Verified: 0
```

Table 7-42 describes the information displayed by the **verifydiskdb Status** status command.

Table 7-42 verifydiskdb status Command Display

Parameter	Description
Slot	Current slot whose databases on active and standby PXM hard drives are being compared.
Databases:	Number of databases detected for the current slot.
Tables	Total number of tables detected for all databases for the slot.
DB Index:	Index number of the current database being compared.
DB Name:	Name of the database currently being compared.
Table Details:	Details about the current table being compared.
Table Index:	Index number of the current table being compared.
Table Name:	Name of the current table being compared.
Total Records:	Total number of records.
Records Verified:	Number of records verified.
Databases Verified:	Number of databases verified.
Tables Verified:	Number of tables verified.

Note To stop the disk verification task while it is in progress, enter the **verifydiskdb abort** command.

Displaying the Contents of the Disk Verification Utility Log File

When the disk verification task is complete, a log file of the task is stored in the log folder on your hard drive. Each log file contains a header with the slot number and the status of the card.

If more information about the discrepancies is determined, it is stored in the log file. However, there is no comparison between data on the hard disk versus data on the card.

To view the disk verification utility log file, enter the **verifydiskdb display** command as shown in the following example:

pop20two.7.PXM.a > **verifydiskdb display**

If you want to view an older log file, enter the **verifydiskdb display** command with the **-l old** option, as shown in the following example:

pop20two.7.PXM.a > **verifydiskdb display -l old**

Note The directory only keeps two log files per slot. If disk verification is executed a third time for a slot that contains two log files, the older of the two files is removed.

If no discrepancies are found on a card, the log file contains only the slot number, timestamp of the verification task, and a message stating that no discrepancies were found, as shown in the following example:

```
------------------  Information for Slot  5 ------------------
Start: 22/05/2002-10:31:19    -    End: 22/05/2002-10:31:27

             Verify DONE

 TotalofDbs= 2, TotalofTbls= 15, #DbVerf=2, #TblVerf= 15
             No Discrepancies found for slot 5
--------------------------------------------------------------
```

If discrepancies were found on a card, the log file contains the names of the databases and tables in which the discrepancies were found, as shown in the following example:

```
------------------  Information for Slot  1 ------------------
Start: 20/04/2002-17:43:49    -    End: 20/04/2002-17:43:57

             Verify DONE

 TotalofDbs= 4, TotalofTbls= 20, #DbVerf=4, #TblVerf= 20
=============================================================
dbInd: 2 - dbName: EmDiskDb
tblInd: 17 - tblName: LineTable
Record: 8  ActvChkSum: 0 StdbyChkSum: 549
=============================================================
dbInd: 2 - dbName: EmDiskDb
tblInd: 17 - tblName: LineTable
Record: 9  ActvChkSum: 0 StdbyChkSum: 549
===============================================================

                 Verification Slot Summary
Start: 20/04/2002-17:43:49    -    End: 20/04/2002-17:43:57
Total Discrepancies Found: 2, Total Discrepancies Sync: 0
--------------------------------------------------------------
```

If the verification utility is run on a slot in which no card resides, the display will show that the slot was invalid and has been skipped, and shown in the following example:

```
--------------------------------------------------------------
------------------  Information for Slot  2 ------------------
Start: 22/05/2002-10:31:10    -    End: 22/05/2002-10:31:10

           Verify SKIPPED - INV_SLOT

 TotalofDbs= 0, TotalofTbls= 0, #DbVerf=0, #TblVerf= 0
             No Discrepancies found for slot 2
--------------------------------------------------------------
--------------------------------------------------------------
```

If the card is in an unstable state, the display indicates that the verification utility has skipped that slot because it is unstable, as shown in the following example.

```
------------------  Information for Slot  4 ------------------
Start: 20/04/2002-17:44:06    -    End: 20/04/2002-17:44:06

           Verify SKIPPED - UNSTABLE SLOT

 TotalofDbs= 0, TotalofTbls= 0, #DbVerf=0, #TblVerf= 0
             No Discrepancies found for slot 4
--------------------------------------------------------------
```

If a firmware upgrade had not finished (the commitrev command had not yet been used on the slot), the display indicates that the verification utility has skipped that slot because a REV_CHG is in progress, as shown in the following example:

```
------------------  Information for Slot  6 ------------------
Start: 20/04/2002-17:44:14    -    End: 20/04/2002-17:44:14

           Verify SKIPPED - REV_CHG

 TotalofDbs= 0, TotalofTbls= 0, #DbVerf=0, #TblVerf= 0
             No Discrepancies found for slot 6
--------------------------------------------------------------
```

If more than 20 discrepancies are found in a table or database, the utility is terminated and the display indicates that the slot is unstable, and lists the names of the tables and databases where the discrepancies were found. The following example shows the display for an unstable slot with more that 20 discrepancies:

```
-----------------  Information for Slot  9 ------------------
Start: 20/04/2002-17:44:54    -    End: 20/04/2002-17:44:57

           Verify SKIPPED - UNSTABLE SLOT

 TotalofDbs= 2, TotalofTbls= 6, #DbVerf=0, #TblVerf= 0
=============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1782  ActvComdID: 0 StdbyComID: 7
=============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1783  ActvComdID: 0 StdbyComID: 7
=============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1784  ActvComdID: 0 StdbyComID: 7
=============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1785  ActvComdID: 0 StdbyComID: 7
=============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1786  ActvComdID: 0 StdbyComID: 7
=============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1787  ActvComdID: 0 StdbyComID: 7
=============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1788  ActvComdID: 0 StdbyComID: 7
=============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1789  ActvComdID: 0 StdbyComID: 7
=============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1790  ActvComdID: 0 StdbyComID: 7
=============================================================
dbInd: 1 - dbName: sm_mib_v21
```

```
tblInd: 5 - tblName: mib29
Record: 1791  ActvComdID: 0 StdbyComID: 7
==============================================================
dbInd: 1 - dbName: sm_mib_v21
tblInd: 5 - tblName: mib29
Record: 1792  ActvComdID: 0 StdbyComID: 7
==============================================================
```

Note The disk verification utility only logs discrepancies. It does not synchronize the differences.

Troubleshooting Discrepancies Between the Active and Standby Disk

If discrepancies are found by the disk verification utility, either:

- Locate the event logs that pertain to the affected database(s) for the indicated slot

  or

- Enter the **resetcd** command to reset the standby PXM45 control card to resynchronize with the active PXM45 control card's disk.

If you provision connections while the **verifydiskdb check** command is running, discrepancies might be flagged, even if the information between the active PXM45 disk and the standby PXM45 disk is synchronized. To ensure an accurate log of discrepancies, wait for the **verifydiskdb check** to finish running before you provision connections.

Managing Line Loopbacks

In a loopback test, signals are sent and then directed back toward their source from some point along the communications path. Configure a line to loopback when you want to test interface usability. Use the following procedure to test line signalling on an AXSM, AXSME, AXSME32 card.

Step 1 Connect a single line to the appropriate transfer and receive ports on the backcard you want to test.

Step 2 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 3 Enter the **cc** command to change to the appropriate AXSM card.

Step 4 Enter the **dsplns** command to display the configuration for all lines on the current card.

Step 5 Enter the **addlnloop** <-*line type*> <*bay.line*> <-lpb *loopback type*> command. described the possib;le options for each AXSM card type.

Table 7-43 addlnloop Command options

Parameter	Description
-line type	Specifies the type of line on which to perform the loopback test will. For an AXSM card, the possible line types are: • -ds3 • -sonet For an AXSME card, the possible line types are: • -ds3 • -e3 • -sonet • -ds1 • -e1 For an AXSME-32 card, the only possible line types is -ds1. **Note** For AXSM cards, the keyword ds3 applies to both T3 and E3 line types.
bay.line	Identifies the bay (1 or 2) and the number of the line. The line number can be 1 to the highest numbered line on the back card.
-lpb	Specifies the type of loopback: • 1 = NoLoop • 2 = Local • 3 = Remote

Enter the **dsplns** command to verify that the appropriate line is in the specified loopback state.

```
M8850_NY.1.AXSM.a > dsplns
                                                   Medium Medium
  Sonet         Line     Line       Line    Frame  Line   Line     Alarm  APS
  Line          State    Type       Lpbk   Scramble Coding Type    State  Enabled
  ------------- ----- ------------ ------ -------- ------ -------- ------ -------
   1.1             Up  sonetSts12c  Local   Enable    NRZ ShortSMF  Clear Disable
   1.2             Up  sonetSts12c NoLoop   Enable    NRZ ShortSMF  Clear Disable
   2.1           Down  sonetSts12c NoLoop   Enable    NRZ ShortSMF  Clear Disable
   2.2           Down  sonetSts12c NoLoop   Enable    NRZ ShortSMF  Clear Disable
```

Enter the **dsplns** <*line type*> <*bay.line*> command to verify that the appropriate line is in the specified loopback state. Replace <*line type*> with the appropriate line type. Replace <*bay.line*> with the appropriate bay and line number.

```
M8850_NY.1.AXSM.a > dspln -sonet 1.1
  Line Number             : 1.1
  Admin Status            : Up                  Alarm Status         : Clear
  Loopback                : Local               APS enabled          : Disable
  Frame Scrambling        : Enable              Number of ports      : 0
  Xmt Clock source        : localTiming         Number of partitions: 0
  Line Type               : sonetSts12c         Number of SPVC       : 0
  Medium Type(SONET/SDH)  : SONET               Number of SPVP       : 0
  Medium Time Elapsed     : 654                 Number of SVC        : 0
  Medium Valid Intervals  : 0
  Medium Line Type        : ShortSMF
```

In the following example, the user adds a local loop on an AXSM card's sonet line.

```
M8850_NY.1.AXSM.a > addlnloop -sonet 1.1 -lpb 2
Line loop-back status will be changed.
Do you want to proceed (Yes/No) ? y
```

Note Before you can change the loopback type for an existing loopback, you must firs't delete the loopback by executing **dellnloop,** or you can just enter the **addlnloop** command with the -lpb 1 (No loopback) option.

Deleting a Loopack State

Enter the **dellnloop** <*line type*> <*bay.line*> command to delete a loopback state on a specified line. Replace <*line type*> with the appropriate line type. Replace <*bay.line*> with the appropriate bay and line number.

```
M8850_NY.1.AXSM.a > dellnloop -sonet 1.1
```

Enter the **dsplns** command to verify that the loopback state was deleted on the appropriate line.

Configuring a line loopback

If a connection fails and you do not know which end of the connection is causing the problem, putting a line into loopback mode can help you determine what the problem is and where it occurs on a connection. In an MGX 8850 and MGX 8950 switches, loopback lines provide CLI-based line level monitoring capabilities.

When a line is put into loopback, the receiving switch takes all of the data it receives and returns it unchanged back to the sender. The physical line in a loopback configuration is connected between a CPE and a switch; one physical line is connected from the tx (Transmit port) of the CPE to the rx (receive) port of a card on the switch you are testing. Another physical line is connected between the tx port of the same card and the receive port of the CPE.

Configuring Loopback Line Tests on AXSME Cards

Once the physical connection is established, you need to use the CLI to put the connection into loopback mode.

The following types of loopback are supported on the AXSME:

- Far-end line loopback - Loopback appears at the far-end of the CPE when you send a loopback activation code from the AXSME. The CPE enters a loop mode in which it returns the received data back to the AXSME. The CPE continues to return the data back until it receives a no-loopback request.This kind of loopback can be used to run tests, such as BERT.
- Far-end payload loopback- Loopback is similar to FarEnd loopback, except that the payload portion of the data is re-transmitted. Framing is done by the Far end again.
- Remote line loopback - Loopback returns the remote data back to the far end. The received data stream is looped back into the transmit path, overriding the data stream created internally by the framer.
- Local loopback - Loopback allows the transmitted data to be looped back into the receiving path. It can be used to test the internals of the AXSME card.

Once your physical line is connected, you can perform a loopback test using the following procedure.

Step 1 Connect a single line to the appropriate transfer and receive ports on the backcard you want to test.

Step 2 Establish a configuration session with the active AXSM or AXSME card using a user name with SERVICE_GP privileges or higher.

Step 3 Enter the **dsplns** command to display the configuration for all lines on the current card.

Step 4 Enter the **addlnloop** command to add a line loopback. Table ** describes the possible options for each AXSM card type. The **addlnloop** command parameters are different, depending on which time of AXSM on which you are adding a loopback line.

addlnloop <-line type> <bay.line> -lpb <*loopback type*>

Table 7-44 addlnloop Command Parameters

Parameter	Description
-Line type	Replace *line type* of line on which you are configuring loopback. On an AXSM card, possible lines are: • -ds3 • -sonet On an AXSME card, possible lines are: • -ds3 • -e3 • -sonet • -ds1 • -e1 **Note** On an AXSME-32 card, -ds1 is the only possible option.

Table 7-44 addlnloop Command Parameters

Parameter	Description
bay.line	Identifies the bay (1 or 2) and the number of the line. The line number can be 1 to the highest numbered line on the back card.
-lpb	Specifies the loopback type for the line type. The entry for no loopback (1) removes any existing loopback. • 1 = No loopback • 2 = Local loopback • 3 = Remote loopback

In the following example, the user puts a sonet line into a local loopback state on an AXSM card.

```
MGX8850.1.11.AXSME.a > addlnloop -sonet 1.1 -lpb 2
```

Step 5 Enter the **dspln** -<*line type*> <*line_num*> command to verify the that the appropriate line is in the specified loopback state.

```
8850_NY.10.AXSME.a > dspln -ds1 1.1
  Line Number         : 1.1
  Admin Status        : Down              Alarm Status         : Clear
  Line Type           : dsx1ESF           Number of ports      : 0
  Line Coding         : dsx1B8ZS          Number of partitions: 0
  Line Length(meters) : 40                Number of SPVC       : 0
  Loopback            : Local             Number of SPVP       : 0
  Xmt. Clock source   : localTiming       Number of SVC        : 0
  Valid Intervals     : 0
```

Note Before you can change the loopback type for an existing loopback, you must first delete the loopback by executing **dellnloop**, or you can just enter the **addlnloop** command with the -lpb 1 (No loopback) option.

Configuring a loopback line on Connection

A channel (or connection) loopback tests the integrity of the connection at the local UNI or across the network. The maximum number of connection loopbacks that can exist on an AXSM is 256. Each connection can have only one loopback at a time. Therefore, you cannot add a loopback on the receive end and the transmit end at the same time. The loopback remains until you delete it by executing the **delchanloop** command.

on a per-port basis, use the **dspchanloop** command.

Warning **Do not run channel loopback test on a network that is not carrying live traffic. Channel loopback tests are very intrusive.**

Once your physical line is connected, you can perform a loopback test using the following procedure.

Step 1 Connect a single line to the appropriate transfer and receive ports on the backcard you want to test.

Step 2 Establish a configuration session with the active AXSM card using a user name with SERVICE_GP privileges or higher.

Step 3 Enter the **dsplns** command to display the configuration for all lines on the current card.

Step 4 Enter the **addchanloop** <*ifNumber*> <*vpi*> <*vci*> <*loopback mode*> command. Table ** describes the possible options for each AXSME card type.

Table 7-45 addchanloop Command Parameters

Parameter	Description
-*ifNumber*	The logical port number. The ranges for AXSM are as follows: • AXSM: 1-60 • AXSM-E: 1-32
VPI	Specifies the VPI of the connection. The range is 0-4095.
VCI	Specifies the VCI of the connection. The range is 1-65535.
loopback mode	Specifies the direction of the loopback line. • 1 = ingress direction • 2 = egress direction

In the following example, the user adds a connection loopback in the ingress direction on logical port 4. The connection loopback has a VPI of 1 and a VCI of 50.

```
pop20two.1.AXSM.a > addchanloop 4 1 50 1
```

Step 5 Enter the **dspchanloop** <*ifNum*> command to verify the that the appropriate line is in the specified loopback state.

```
8850_NY.10.AXSME.a > dspchanloop 1

Loop Back Connection on Interface 1
Index   Conn LCN   ifNum   Vpi   Vci
 4
```

Before you can change the loopback type for an existing loopback, you must first delete the loopback by executing dellnloop, or you can just enter the addlnloop command with the -lpb 1 (No loopback) option.

Configuring a Bit Error Rate Test on an AXSM

BERT commands can help you analyze and resolve problems on a physical interface. To conduct a BERT on a line, a user sends a specified pattern over a line that is configured in loopback mode at the far end. The local end receives the loopback pattern, and the user compares the local end pattern to the original pattern sent from the far end. The number of bit errors discovered in the local (or receive) end pattern help the user determine the quality of the physical line.

Note BERT is only available for T1 lines and IMA cards.

Step 1 Put the appropriate lines into loopback mode.

Step 2 Establish a configuration session with the active PXM45 using a user name with SERVICE_GP privileges or higher.

Note BERT commands are available only on the PXM45 card. However, you can run BERT on any AXSM card that supports T1 lines or IMA.

Step 3 Enter the **dspbertcap** command to display the loopback and BERT capabilities of a specific line or port on the current card. The display shows you which test patterns and loopback numbers are available on the current service module.

```
dspbertcap <SM Interface> <Test Option>s
```

Parameter	Description
SM Interface	The format of Service Module Interface is: SMslot.SMLine[.SMport], as follows: SMslot can have a value in one of the following ranges: 1-6, 9-14, 17-22, 25-30. SMLine has a range from 1 though the maximum number of lines on the card. The optional SMport has a value from 1 though the maximum ports supported by the service module.
Test Option	Type one of the following numbers to select the capability to display: 1: BERT capability 2: Loopback capability

Step 4 Enter the **cc** command to change to the appropriate AXSM card on which you want to run BERT.

Step 5 Enter the **cnfbert** command as follows to set up BERT parameters on the looped back connection. You must use the available test patterns and loopback numbers displayed with the **dspbertcap** command in Step 3.

```
Unknown.7.PXM.a > cnfbert -ln <bay.line> -tp <testPattern> -tpi <transmit pattern inverse>
-rpi <singleBitErrInsert> -eir <error insertion rate>
```

Table 7-46 cnfbert Command Parameters

Parameter	Description
-ln	Replace <*bay*> with the number “1” to indicate the upper bay, or “2” to indicate the lower bay. Replace <*line*> with the number of the line you are testing as follows: • For OC12, enter the number “1.” • For OC3, enter a number from “1” through “4.” • For T1, enter the number “1.” • For T3and E3, enter a number from “1” through “8.”
-tp	Test pattern to be generated. Enter the appropriate number, from 1 to 32, to indicate the appropriate patterns. **Note** Enter the **dspbert** command to view all the possible test patterns.
-tpi	Enter the number “2” to invert the transmit BERT pattern. Enter the number “1” to ensure that the transmit BERT patter is not inverted.
-rpi	Enter the number “2” to invert the transmit BERT pattern. Enter the number “1” to ensure that the transmit BERT patter is not inverted.
-eir	Injects errors into the transmitted pattern. Replace <*error insertion rate*> with a number in the range 1-8: • 1 = noError(1): No bit errors are inserted. • 2 = oneInTen: Insert bit errors at the rate of 1 bit error per 10 bits(10-1) transmitted. • 3 = oneInHundred: Insert bit errors at the rate of 1 bit error per 100 bits(10-2) transmitted. • 4 = oneInThousand: Insert bit errors at the rate of 1 bit error per 1000 bits(10-3) transmitted. • 5 = oneIn10Thousand: Insert bit errors at the rate of 1 bit error per 10000(10-4) bits transmitted. • 6 = oneInHundredThousand: Insert bit errors at the rate of 1 bit error per 100000 bits(10-5) transmitted. • 7 = oneInMillion: Insert bit errors at the rate of 1 bit error per 1000000 bits(10-6) transmitted. • 8 = oneInTenMillion: Insert bit errors at the rate of 1 bit error per 10,000,000(10-7)bits transmitted.

In the following example, the user enables BERT on line 1 in the lower bay of the AXSM-E card in slot 11.

```
Unknown.11.AXSME.a > cnfbert -ln 2.1 -tp 3 -tpi 2 -rpi 2 -eir 8
```

Step 6 After the BERT has been running for at least 30 minutes, enter the **dspbert** <*bay*> command to display the BERT result

```
Unknown.11.AXSME.a > dspbert <bay.line>.
```

Replace <bay> with the number “1” to indicate the upper bay, or “2” to indicate the lower bay. Replace

Note The **dspbert** command can be issued even while the BERT is in operation.

In the following example, the user displays the BERT results for line 11 on an AXSME card located in the upper bay.

```
Unknown.11.AXSME.a > dspbert 1.11

        Start Date                      : 08/29/2002
        Current Date                    : 08/29/2002
        Start Time                      : 18:43:07
        Current Time                    : 16:56:23
        Physical Slot Number            : 22
        Logical Slot Number             : 22
        Line Number                     : 1 (Line test)
        Device To Loop                  : Local Loopback
        BERT Pattern                    : Double One Zero Pattern
        Error Inject Count              : 0
        Bit Count                       : 3091031099
        Bit Count Received              : 3091031099
        Bit Error Count                 : 0
        Bit Error Rate (BER)            : 0
        Bit Counter Overflowed          : 6 <times>

                BERT is in sync.
```

Deleting a Configured Bit Error Rate Test

There are two ways to terminate a configured BERT.

1. Enter the **delbert** *<SM Interface>* command. Replace *<SM Interface>* with the service module interface number in the format slot.line.port. In the following example, the user deletes BERT from line 1 on port 2 in the AXSME in slot 11.

```
Unknown.7.PXM45.a > delbert 11.1.1
```

2. Enter the **cnfbert** command with the -en option disabled. (See Table 7-46 for a description of the **cnfbert** command parameters.)

```
Unknown.7.PXM.a > cnfbert -cbif 25.1.0 -pat 1 -lpbk 14 -en 6
```

Diagnostics Support MGX 8850 and MGX 8950 Switches

Diagnostics tests run on all the major hardware components that belong to the AXSM and PXM45 front card and their lower back cards, and the connection path between these components. You can configure a hardware-oriented test to check the health of the active and standby AXSME front card. Tests can be run on standby card, the active card, or both cards at the same time.

The MGX 8850 and MGX 8950 switch support both online and offline diagnostics.

- Online diagnostics tests run in the background while a card is in an operational state. These tests are non-intrusive and run with minimal overhead. Online diagnostics can be used to detect hardware errors diagnosis. Its goal is to monitor any potential errors at a card level while a card is in normal operation. You can stop a test at any time by issuing a new diagnostic configuration to disable it. If the online diagnostics test fails on the active card, a switchover is triggered and the active card becomes the standby, and an error message comes on declaring the standby card as failed.

Note Online diagnostics do not detect operational errors.

- Off-line diagnostics ensure the standby card is ready to be switched over to. Offline diagnostics tests are performed only on the standby card. Areas for diagnosis include hardware components and cell paths. Off-line diagnostics are destructive. Intensive tests are performed on a card including memory tests and registers read/write tests. It temporarily puts a standby card out of service and makes it unavailable to be switched over to in case of active card failure. When tests are done, the card is reset to its normal state. If the active card fails while the standby card is running off-line diagnostics, off-line diagnostics are immediately aborted

Note Off-line diagnostics will not be performed on cards with APS configured.

The MGX 8850 and MGX 8950 switches run offline diagnostics in the following areas:

- Processor subsystem: NVRAM and BRAM
- ASIC tests: Atlas (register test, ingress memory, egress memory) and framer (register test)
- UI S3 back card: UIS3 BC register test

Both control path and data path must to be tested in order to have a complete test coverage on the entire connection path within a card. The control path is the path that carries IPC messages between cards. The diagnostic data path is the path for cells travelling between the backplane and the loop back device.

Configuring Offline and Online Diagnostics Tests on the AXSME Card

At the active PXM45, enter the **cnfdiag** command as follows to enable online diagnostics tests on the appropriate card:

```
8850_NY.7.PXM.a >cnfdiag <slot> <onEnb> <offEnb> [<offCover> <offStart> <offDow>]
```

Note Diagnostics commands are run from the PXM45, regardless of whether they are testing the PXM or the AXSM

Table 7-47 tells you how to set these parameters to run online diagnostics tests.

Table 7-47 cnfdiag command Parameters

Parameter	Description
slot	Enter the slot of the card for which to configure the diagnostics. For the AXSME, the slot number will be *7* or *8*.
onEnb	Enter *enable* to enable online diagnostic on the card. Enter *disable* to disable offline diagnostics.
offEnb	Enter *enable* to enable offline diagnostics. Enter *disable* to ensure that offline diagnostics are disabled while online diagnostics are running.
offCover	Set the offline diagnostics coverage time to light, medium, or full. light = 5 minutes or less medium = 30 minutes or less full = any number of minutes-no limit **Note** You do not need to set this parameter if you are not enabling offline diagnostics.
offStart	Set the time for the offline diagnostics to begin using 24 hour time. The format is: hh:mm. For example: 03:45 or 22:30 **Note** You do not need to set this parameter if you are not enabling offline diagnostics.
offDow	Sets the day of the week for the offline diagnostics to run. The format is SMTWTFS. **Note** You do not need to set this parameter if you are not enabling offline diagnostics.

Warning **Do not remove the active PXM while the offline diagnostic is running on the redundant PXM. If you remove it, the redundant PXM reboots but will not be able to become active unless its hard disk drive was previously synchronized to the hard disk on the previously active PXM.**

Example 7-1 Configuring online diagnostics only

In the following example, the user enables online diagnostics only for the AXSME in slot 7.

```
8850_NY.7.PXM> cnfdiag 7 enable disable
```

Example 7-2 Configuring offline diagnostics only

In the following example, the user enables online diagnostics for the AXSME in slot 7. A medium online diagnostics coverage test is scheduled to run every Wednesday at 11:30 (11:30 AM).

```
8850_NY.7.PXM> cnfdiag 7 disable enable medium 11:30 -W
```

Example 7-3 Configuring both online and offline diagnostics at the same time

In the following example, the user enables both online and offline diagnostics for the AXSME in slot 8. A medium offline diagnostics coverage test is scheduled to run every Monday and Friday at 21:30 (8:30 PM).

```
8850_NY.7.PXM> cnfdiag 7 enable enable medium 21:30 -M-F
```

To display your online diagnostics test configuration and ensure all the parameters have been set correctly, enter the **dspdiagcnf** command.

Enabling Online and Offline Diagnostics Tests on the All Cards in a Switch

Enter the **cnfdiagall** command as follows to enable and configures online or offline diagnostics for all card slots:

```
8850_NY.7.PXM> cnfdiagall <onEnb> <offEnb> [<offCover> <offStart> <offDow>]
```

Table 7-48 cnfdiagall Command

Parameter	Description
onEnb	Enable or disable online diagnostics. The default is disable.
offEnb	Enable or disable offline diagnostics. The default is disable.
offCover	Set the offline diagnostics coverage time to light, medium, or full. • light = 5 minutes or less • medium = 30 minutes or less • full = any number of minutes-no limit
offStart	Set the time for the offline diagnostics to begin using 24 hour time. The format is: hh:mm. For example: 03:45 or 22:30
offDow	Sets the day of the week for the offline diagnostics to run. The format is SMTWTFS. For example: -M-W--- is Mondays and Wednesdays only.

Example 7-4 Configuring online diagnostics only

In the following example, the user enables online diagnostics only for all cards in the switch.

```
cnfdiag 7 enable disable
```

Example 7-5 Configuring offline diagnostics only

In the following example, the user enables online diagnostics for all cards in the switch. A medium online diagnostics coverage test is scheduled to run every Wednesday at 11:30 (11:30 AM).

```
cnfdiag 7 disable enable medium 11:30 -W
```

Example 7-6 Configuring both online and offline diagnostics at the same time

In the following example, the user enables both online and offline diagnostics for all cards in the switch. A medium offline diagnostics coverage test is scheduled to run every Monday and Friday at 21:30 (8:30 PM).

```
cnfdiag 7 enable enable medium 21:30 -M-F
```

To display your online diagnostics test configuration and ensure all the parameters have been set correctly, enter the **dspdiagcnf** command.

Displaying Online and Offline Diagnostics Test configuration information

Enter the **dspdiagcnf** command to display the current diagnostics configuration on a card. The **dspdiagcnf** command displays the following information:

- Slot number
- Whether online diagnostics are enabled or disabled
- Whether offline diagnostics are enabled or disabled
- The type of coverage currently running for offline diagnostics
- The Start time for offline diagnostics
- The day(s) of the day on which offline diagnostic tests are scheduled to run.

The following example shows the information displayed by the **dspdiagcnf** command.

```
Unknown.7.PXM.a > dspdiagcnf
      Online   -------------- Offline -------------
Slot  Enable   Enable  Coverage  StartTime  SMTWTFS
----  ------   ------  --------  ---------  -------
1     enable   enable  light     15:13      ---W---
2     enable   enable  light     15:13      ---W---
3     enable   enable  light     15:13      ---W---
4     enable   enable  light     15:13      ---W---
5     enable   enable  light     15:13      ---W---
6     enable   enable  light     15:13      ---W---
7     disable  enable  light     15:13      ---W---
8     enable   enable  light     15:13      ---W---
9     enable   enable  light     15:13      ---W---
10    enable   enable  light     15:13      ---W---
11    enable   enable  light     15:13      ---W---
12    enable   disable light     15:13      ---W---
13    enable   enable  light     15:13      ---W---
14    enable   enable  light     15:13      ---W---
15    disable  disable light     15:13      ---W---
16    disable  disable light     15:13      ---W---
17    enable   enable  light     15:13      ---W---
18    enable   enable  light     15:13      ---W---
19    enable   enable  light     15:13      ---W---

Type <CR> to continue, Q<CR> to stop: 20    enable   enable  light     15:13
```

Displaying online diagnostic errors

Enter the **dspdiagerr online** command to display the current online diagnostics errors for all cards in a switch.

```
Unknown.7.PXM.a > dspdiagerr online
 Slot Date   Time  Message
 ---- ----   ----  -------
1    --     --
2    --     --
3    --     --
4    --     --
5    --     --
6    --     --
7    --     --
8    --     --
9    --     --
10   --     --
11   --     --
12   --     --
13   --     --
14   --     --
15   --     --
16   --     --
17   --     --
18   --     --
19   --     --
20   --     --

Type <CR> to continue, Q<CR> to stop: 21   --     --
```

Displaying offline diagnostic errors

.Enter the **dspdiagerr offline** command to display the current online diagnostics errors for all cards in a switch,

```
Unknown.7.PXM.a > dspdiagerr online
 Slot Date   Time  Message
 ---- ----   ----  -------
1    --     --
2    --     --
3    --     --
4    --     --
5    --     --
6    --     --
7    --     --
8    --     --
9    --     --
10   --     --
11   --     --
12   --     --
13   --     --
14   --     --
15   --     --
16   --     --
17   --     --
18   --     --
19   --     --
20   --     --

Type <CR> to continue, Q<CR> to stop: 21   --     --
```

Enter the **dspdiagstat** command to display the number of times that the diagnostics has run. The output shows the number of attempts and the number of failures for both offline and online diagnostics.

```
Unknown.7.PXM.a > dspdiagstat 7

Slot 7 diagnostics statistics:

online diag attempted  = 0x00001a26
online diag passed     = 0x00001a26
online diag failed     = 0x00000000
offline diag attempted = 0x00000000
offline diag passed    = 0x00000000
offline diag failed    = 0x00000000
```

Enter the **dspdiagstatus** command to display the diagnostics status and role (active or standby) for each card on the switch. The diagnostics statuses are:

- Idle—Slot is in an idle state because there is no card in the slot, or due to an error.
- Ready—Card is active and ready for diagnostics test.
- Offline—Card is offline.
- Online—Card is online

```
Unknown.7.PXM.a > dspdiagstatus
 Slot  State    Role
 ----  -----    ----
1     Idle     UNKNOWN CARD ROLE
2     Idle     UNKNOWN CARD ROLE
3     Idle     UNKNOWN CARD ROLE
4     Idle     UNKNOWN CARD ROLE
5     Idle     UNKNOWN CARD ROLE
6     Idle     UNKNOWN CARD ROLE
7     Ready    ACTIVE CARD ROLE
8     Idle     UNKNOWN CARD ROLE
9     Idle     UNKNOWN CARD ROLE
10    Idle     UNKNOWN CARD ROLE
11    Idle     UNKNOWN CARD ROLE
12    Idle     UNKNOWN CARD ROLE
13    Idle     UNKNOWN CARD ROLE
14    Idle     UNKNOWN CARD ROLE
15    Ready    ACTIVE CARD ROLE
16    Idle     UNKNOWN CARD ROLE
17    Idle     UNKNOWN CARD ROLE
18    Idle     UNKNOWN CARD ROLE
19    Idle     UNKNOWN CARD ROLE
20    Idle     UNKNOWN CARD ROLE

Type <CR> to continue, Q<CR> to stop:
```

CHAPTER 8

Switch Maintenance Procedures

This chapter describes the configuration changes that are needed after a switch has been initialized, started, and configured, and you want to do any of the following tasks:

- Add cards
- Replace cards
- Upgrade cards
- Decommission an AXSM slot
- Decommission an RPM slot

AXSM and RPM slots must be decommissioned when you want to change the type of card that runs in the slot.

Adding Cards

After the initial installation and configuration of an Cisco MGX 8850 or Cisco MGX 8950 switch, you can add additional cards to empty slots in the chassis. When you add a card, as opposed to replacing a card, you must configure the switch to recognize the new card. The following sections describe how to configure the switch to recognize new PXM45 cards and AXSM cards.

Adding a Standby PXM45 Card

During installation, single or redundant PXM45 cards can be installed in the switch. The procedure for initializing cards after installation is described in the "Initializing the Switch" section in Chapter 2, "Configuring General Switch Features."

When you add a PXM45 card to the switch, you are adding a standby PXM45 card to a switch with a single active PXM45 card.

Note If you are replacing a PXM45 card that previously operated as either an active or standby card in this switch, see the "Replacing Cards with the Same Card Type" section, later in this chapter.

When adding a standby PXM45 card to your switch, you need to physically install the PXM45 card and the back cards in the following order:

1. PXM Hard Drive card (PXM-HD)
2. PXM45-UI-S3 card
3. PXM45 front card

After the new standby PXM45 front and back cards are installed, the active PXM45 card will initialize the standby card set. The initialization procedure takes some time. You can verify that initialization is complete by entering the **dspcd** command with the standby slot number, for example, **dspcd 8**. If the front card state is "Standby," initialization is complete.

Adding AXSM Cards

When you add an AXSM card to a switch, you are adding new front and back cards to a slot that is not configured for an AXSM card. The following procedure describes how to add AXSM cards to unconfigured slots.

Note If the slot has been previously configured for an AXSM card, you can either replace that card with a card of the same type or you can decommission the slot. If you are replacing an AXSM card that previously operated in this switch, see "Replacing AXSM Cards," which appears later in this chapter. For instructions on decommissioning a slot, see the "Decommissioning an AXSM Slot" section later in this chapter.

Step 1 Before installing the hardware, enter the **dspcd** command to verify that the slot in which you want to add the card has not been configured. In the following example, the **dspcd** report shows that slot 14 is not configured.

```
pop20one.7.PXM.a > dspcd 14
ERR: The slot specified, has no card configured in it.
ERR: Syntax: dspcd ["slot_number"]
        slot number -- optional;
```

Step 2 Install the ASXM card and the appropriate back cards in an unconfigured slot as described in the *Cisco MGX 8850 Hardware Installation Guide (PXM45/B and PXM1E)* or the *Cisco MGX 8950 Hardware Installation Guide.*

After the new AXSM front and back cards are installed, the Fail LED on the front card flashes and none of the LEDs on the back cards are lit. If you enter the **dspcds** command, the card state in the display appears as Failed.

Step 3 To initialize the slot for the AXSM card, enter the following command:

```
mgx8850a.7.PXM.a > setrev <slot> <revision>
```

Replace <*slot*> with the card slot number for the new AXSM card. Replace <*revision*> with the software version number for the runtime firmware the card will use. You can find the software version number in the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3*. To determine the version number from the runtime firmware filename, see "Determining the Software Version Number from Filenames," which appears in Chapter 7, "Switch Operating Procedures."

Note After installation, each card should be initialized with the **setrev** command only once. For instructions on upgrading the software on a card, refer to Appendix A, "Downloading and Installing Software Upgrades."

Step 4 When prompted to confirm the command and reset the card, type **y** and press **Return**.

After you confirm the command, the slot initializes, the runtime firmware loads on the AXSM card, and the card resets. Be patient—the card reset takes a couple of minutes. While the card is resetting, you can use the **dspcds** command to display the status of the AXSM card. If you enter the command frequently, you will see the card state change from Empty to Boot/Empty to Empty to Init/Empty and finally to Active/Active.

Step 5 To verify that the new card is running the correct firmware, enter the **dspcd** command with the correct slot number. The following example shows that the AXSM card in slot 1 is running firmware version 2.1(0).

```
8850_LA.7.PXM.a > dspcd 1
8850_LA                          System Rev: 02.01   Mar. 05, 2001 00:03:23 GMT
MGX8850                                              Node Alarm: NONE
Slot Number:   1    Redundant Slot: NONE

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      AXSM_4OC12          SMFIR_2_OC12        SMFIR_2_OC12
Reserved Card:      AXSM_4OC12          SMFIR_2_OC12        SMFIR_2_OC12
State:              Active              Active              Active
Serial Number:      SAK0350007N         SAK0346003F         SBK0406001V
Prim SW Rev:        2.1(0)              ---                 ---
Sec SW Rev:         2.1(0)              ---                 ---
Cur SW Rev:         2.1(0)              ---                 ---
Boot FW Rev:        2.1(0)              ---                 ---
800-level Rev:
800-level Part#:    800-05774-05        800-05383-01        800-05383-01
CLEI Code:          BAA1BADAAA          0000000000          BAI9ADTAAA
Reset Reason:       On Power up
Card Alarm:         NONE
Failed Reason:      None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:
8850_LA                          System Rev: 02.01   Mar. 05, 2001 00:03:23 GMT
MGX8850                                              Node Alarm: MAJOR

Crossbar Slot Status:      Present

Alarm Causes
------------
    NO ALARMS
```

After you confirm that the AXSM card has been added and is running the correct software, you can start bringing up lines as described in Chapter 3, "Preparing AXSM Cards and Lines for Communication."

Adding RPM Cards

When you add an RPM card to a switch, you are adding new front and back cards to a slot that is not configured for an RPM card. The following procedure describes how to add RPM cards to unconfigured slots.

Note If the slot has been configured previously for an RPM card, you can either replace that card with a card of the same type or you can decommission the slot. If you are replacing an RPM card that previously operated in this switch, see the "Replacing RPM Cards" section later in this chapter. For instructions on decommissioning a slot, see the "Decommissioning an RPM Slot" section later in this chapter.

Step 1 Before installing the hardware, enter the **dspcd** command to verify that the slot in which you want to add the card has not been configured. In the following example, the **dspcd** report shows that slot 14 is not configured.

```
pop20one.7.PXM.a > dspcd 14
ERR: The slot specified, has no card configured in it.
ERR: Syntax: dspcd ["slot_number"]
        slot number -- optional;
```

Step 2 Install the RPM card and the appropriate back cards in an unconfigured slot as described in the *Cisco MGX 8850 Hardware Installation Guide (PXM45/B and PXM1E)* or the *Cisco MGX 8950 Hardware Installation Guide.*

Step 3 Initialize the RPM card as described in the "Initializing RPM-PR Cards" section in Chapter 5, "Preparing RPM-PR Cards for Operation."

Step 4 Verify the RPM software version level as described in the "Verifying the Software Version in Use" section in Chapter 5, "Preparing RPM-PR Cards for Operation."

Step 5 Establish card redundancy as described in the "Establishing Redundancy Between Two RPM-PR Cards" section in Chapter 5, "Preparing RPM-PR Cards for Operation."

Step 6 Configure RPM communications as described in the *Cisco MGX 8850 Route Processor Module Installation and Configuration Guide*.

Replacing Cards with the Same Card Type

This section describes how to replace cards with another card of the same type. The following sections describe how to replace the following types of cards:

- PXM45 cards
- AXSM cards
- RPM cards

Note For information on replacing a card with a newer hardware version, see the "Upgrading Cards" section later in this chapter.

Replacing PXM45 and PXM45/B Cards

PXM45 front and back cards can be replaced when the switch is operating. If a PXM45 is operating in standalone mode, all calls are interrupted until the PXM45 is replaced and operating correctly. If the switch is using redundant PXM45s, enter the **switchcc** command, if necessary, to ensure that the card you want to replace is operating in standby mode.

Because the PXM45 front and hard disk cards store configuration information that controls switch operation, a nativity check is performed each time a PXM45 front card or hard disk card is added or replaced. If a PXM45 is configured in a Cisco MGX 8850 or Cisco MGX 8950 switch, the backplane serial number is stored on the PXM45 front card and on the PXM45 hard disk card. If a PXM45 card is inserted into a chassis or the card is reset with a command such as **resetsys**, the nativity check is run to determine if the PXM45 cards are native to the chassis. If the chassis serial numbers configured on all PXM45 cards match the switch chassis serial number, the cards are all native and no special action is required.

The purpose of the nativity check is to resolve configuration differences between PXM45 cards. Some configuration is stored on the PXM45 front card, and some information is stored on the PXM45 hard disk card. This information includes the runtime software version to be used. The actual runtime software is stored on the PXM45 hard disk.

Note When you replace a PXM45 or PXM45/B card, the replacement card uses the boot software stored on the replacement card and the runtime software configured for slots 7 and 8. If the boot software stored on the replacement card is not the correct version, you should upgrade it while the card is operating in standby mode. For instructions on upgrading boot software, see Appendix A, "Downloading and Installing Software Upgrades."

If one or more cards are replaced, the nativity check identifies which cards are new to the switch chassis and uses the nativity check results to determine which cards hold the valid configuration. This feature can automatically respond to most configuration mismatches, but some mismatches do require a manual response.

When a switch cannot automatically resolve a nativity check conflict, establish a console port session through the corresponding PXM-UI-S3 card and enter the **shmRecoverIgRbldDisk** command. This command ignores the nativity check and configures the entire switch according to the configuration on the hard disk.

The following sections describe how the automatic response feature works for standalone and redundant PXM45 installations, and how to respond when the system cannot automatically resolve conflicts.

Automatic Response for Standalone PXM45 Installations

For standalone installations, the nativity check feature detects and responds to PXM45 cards as shown in Table 8-1.

Table 8-1 Automatic Response to Nativity Checks in Standalone Installations

Event	Nativity Check Results	Response
PXM45 front card and hard disk card have not changed.	Both PXM45 cards are configured with the correct chassis serial number.	No action is required.
PXM45 front card is replaced with an unconfigured card.	PXM45 front card is not configured and the hard disk card is configured with the correct chassis serial number.	The switch builds the PXM45 front card configuration from the configuration on the hard disk.
PXM45 front card is replaced with a previously configured front card.	PXM45 front card is not configured with the correct chassis serial number. The hard disk card is configured with correct chassis serial number.	The switch rebuilds the PXM45 front card configuration from the configuration on the hard disk.
The hard disk card is replaced with an unconfigured card.	PXM45 front card is configured with the correct chassis serial number, but the hard disk card is not configured.	The hard disk configuration cannot be completely built from the configuration on the front card. You must manually resolve the configuration conflict as described in the "Manually Responding to Nativity Checks" section, which appears later in this chapter.
The hard disk card is replaced with a previously configured hard disk card.	PXM45 front card is configured with the correct chassis serial number, but the hard disk card is not configured with correct chassis serial number.	The hard disk configuration cannot be completely rebuilt from the configuration on the front card. You must manually resolve the configuration conflict as described in the "Manually Responding to Nativity Checks" section, which appears later in this chapter.
PXM45 front card and hard disk card are replaced with unconfigured cards.	No configuration exists on either card.	There is no existing configuration to use. You must configure the switch or restore a saved configuration.
PXM45 front card and hard disk card are replaced with a set that was configured in another switch.	PXM45 front card and hard disk card are configured with matching chassis serial numbers, but the configured serial number does not match the chassis serial number.	The switch uses the configuration on the matched set.
Both PXM45 front card and hard disk card are replaced with cards that were configured in different switches.	PXM45 front and hard disk cards are configured with chassis serial numbers that do not match each other or the backplane serial number for the switch in which they are installed.	In this scenario, you can clear the configuration stored on the PXM45 cards, restore a configuration from a saved file, or you can use the configuration stored on the hard disk. You must manually resolve the configuration conflict as described in the "Manually Responding to Nativity Checks" section later in this chapter.

Automatic Response for Redundant PXM45 Installations

For redundant PXM45 installations, the nativity check is performed only on the active PXM45 card set. If an active PXM45 card set is operating correctly, you can replace any card in the standby or non-active card set, and the active card set will attempt to configure the replacement card and bring it up in standby mode.

When the entire switch is reset, the nativity check is used to determine which card set gains mastership. The card set that gains mastership will attempt to go active and will resolve nativity conflicts as described in Table 8-1. Table 8-2 shows how the nativity check is used to assign mastership to a PXM45 card set.

Table 8-2 Mastership Assignment to PXM45 Card Sets after Nativity Check

Slot 7	**Slot 8**				
Nativity Status	**Both cards non-native**	**Front card non-native**	**Both cards non-native, matched serial nos.**	**Hard disk card non-native**	**Both cards non-native, mismatched serial nos.**
Both cards non-native	Slot 7	Slot 7	Slot 7	Slot 7	Slot 7
Front card non-native	Slot 8	Slot 7	Slot 7	Slot 7	Slot 7
Both cards non-native, matched serial numbers	Slot 8	Slot 8	Slot 7	Slot 7	Slot 7
Hard disk card non-native	Slot 8	Slot 8	Slot 8	No active card set.	No active card set.
Both cards non-native, mismatched serial numbers	Slot 8	Slot 8	Slot 8	No active card set.	No active card set.

Manually Responding to Nativity Checks

When the nativity check discovers conflicts that cannot be automatically corrected, you can resolve the conflict by doing one of the following tasks:

- If you have saved a configuration with the **saveallcnf** command, you can restore the configuration with the **restoreallcnf** command.
- If there is no configuration available, enter the **clrallcnf** command to establish the PXM45 card sets as new, unconfigured cards in the chassis.
- If a configuration exists on a hard drive, enter that configuration to configure the front card and establish nativity for the card set.

If the switch cannot resolve a nativity check conflict and all the cards are operating properly, the PXM45 cards enter stage 1 CLI mode. This mode offers a reduced set of commands that you can use to resolve the conflict.

When operating in stage 1 CLI mode, you can FTP files to the switch in preparation for a new configuration or a configuration restore. You can FTP files to the switch using the procedures described for copying files to the switch in Appendix A, “Downloading and Installing Software Upgrades.”

To rebuild the configuration from a configured hard disk in the switch, do the following tasks:

- Clear the configuration (**clrallcnf**) on the PXM45 front card. Usea PXM45 hard disk card on which the configuration can be erased. (Do not use the PXM45 hard disk that hosts the configuration you want to use.)
- Install the unconfigured PXM45 front card and the configured PXM45 hard disk card in a chassis without a redundant card set.

The switch will build the PXM45 front card configuration from the configuration on the hard disk.

Replacing AXSM Cards

If an AXSM front or back card fails, remove the old card and insert a new card of the same type in the same slot. If the card is a standalone AXSM, all communications are interrupted. It the card is part of a redundant AXSM card set, you can replace the standby AXSM without disrupting traffic through the active card.

The configuration for AXSM cards is stored on the PXM45. The switch will automatically configure a replacement card and start it up. If the card is a standalone card, the card will start up as an active card. If the card is part of a redundant pair, the card will start up in standby mode.

After the replacement AXSM card starts, enter the **dspcd** or **dsprev** command to verify that the AXSM card is using the correct boot software version.

Note The switch automatically selects and loads the correct runtime software for the AXSM based on the configuration for that slot. The switch does not automatically burn boot code for an AXSM. For instructions on upgrading boot code, see Appendix A, "Downloading and Installing Software Upgrades."

Note To replace one type of AXSM front card with another type, you must delete all connections, partitions, ports and down lines. If an AXSM card fails, the same type of AXSM card must be installed in its slot.

Replacing RPM Cards

If you have properly initialized an RPM card as described in the "Initializing RPM-PR Cards" section in Chapter 5, "Preparing RPM-PR Cards for Operation," the configuration for the RPM card is stored on the PXM45 hard disk.

To replace a standalone RPM card, remove the old card and insert a new card of the same type in the same slot. The switch will automatically configure the card and start it up.

Note RPM-PR and RPM-B cards are not interchangeable. When replacing an RPM-PR card, you must replace it with another RPM-PR card. If you want to change types of cards, you must first decommission the slot as describe in the "Decommissioning an RPM Slot" section later in this chapter.

To replace an RPM card that is configured for redundancy, first switch control to the standby card, then replace the card while it is operating in standby mode. If the card you are replacing has failed, there is no reason to switch cards, as the failure should have triggered a switch to the standby card. If you need to switch cards, enter the **softswitch** command as described in the "Switching Between Redundant RPM-PR Cards" section in Chapter 7, "Switch Operating Procedures."

Note After you replace a card that is configured for redundancy, it starts up in standby mode. If the active card is configured to operate as a standby card for multiple RPM cards, enter a **softswitch** command so that the active card returns to its normal standby state.

Upgrading Cards

When you upgrade a card, you are replacing an existing card with a newer version of that card. The following sections describe how to,

- Replace PXM45 cards with PXM45/B cards
- Replace AXSM cards with AXSM/B cards

Note If you plan to upgrade PXM45 cards and AXSM cards, upgrade the PXM45 cards first. Wait until the PXM45/B cards are operating in active and standby modes with the correct software before upgrading AXSM cards. The software version used by the PXM45/B cards should be equal to or later than the version used on the AXSM, AXSM/B, and AXSME cards.

Replacing PXM45 Cards with PXM45/B Cards

PXM45 front cards can be replaced with PXM45/B cards while the switch is operating. If a PXM45 is operating in standalone mode, all calls are interrupted until the PXM45 is replaced and the PXM45/B card is operating correctly. If the switch is using redundant PXM45s, enter the **switchcc** command, if necessary, to ensure that the card you want to replace is operating in standby mode. For redundant PXM45 cards, you are ready to replace the standby card as soon as the other card becomes active. You do not need to wait for the standby card to reach standby mode.

After you replace the PXM45 card, enter the **dspcd** or **dsprev** command to view the boot software version. If the boot software version is not correct for your switch, upgrade it as described in Appendix A, "Downloading and Installing Software Upgrades."

Note When replacing PXM45 cards with PXM45/B cards, the switch performs the same nativity check described earlier in this chapter.

Replacing AXSM Cards with AXSM/B Cards

You can replace AXSM cards with AXSM/B cards of the same type. For example, you can replace an AXSM-4-622 with and AXSM-4-622/B. If the card is a standalone AXSM, all communications are interrupted. It the card is part of a redundant AXSM card set, you can replace the standby AXSM without disrupting traffic through the active card.

The configuration for AXSM cards is stored on the PXM45. The switch will automatically configure a replacement AXSM/B card and start it up. If the card is a standalone card, the card will start up as an active card. If the card is part of a redundant pair, the card will start up in standby mode.

After the replacement AXSM/B card starts, enter the **dspcd** or **dsprev** command to verify that the AXSM/B card is using the correct boot software version.

Note The switch automatically selects and loads the correct runtime software for the AXSM based on the configuration for that slot. The switch does not automatically burn boot code for an AXSM. For instructions on upgrading boot code, see Appendix A, "Downloading and Installing Software Upgrades."

Note To replace one type of AXSM front card with another type of AXSM/B card, you must delete all connections, partitions, and ports, and then down all lines. This is called "decommissioning the slot," and is required, for example, when replacing an AXSM-16-T3E3 with an AXSM-8-155/B. For more information on decommissioning an AXSM slot, see the next section.

Decommissioning an AXSM Slot

When an AXSM card is installed and configured, the configuration is associated with a specific slot number and stored on the PXM45 card. If you replace the AXSM with another card of the same type, the new card will start operating with the established configuration. Any configuration which has been used previously on that card will be discarded, because the configuration is assigned to the slot, not the physical card.

If you want to use a previously configured AXSM slot for a different type of AXSM card, you must first decommission the slot to remove the existing configuration. Otherwise, the switch will attempt to run the old configuration on the new card, and the new card will not operate correctly.

Note If you enter the **cnfpnportsig** command to change default port values, you must run the **delpnport** command to delete the port from the PXM45. If you do not run **delpnport** on the PXM45, the port will remain in a provisioning state on the PXM45.

To decommission a slot, you need to remove the existing connections, partitions, and ports as described below.

Step 1 Establish a configuration session using a user name with CISCO_GP privileges.

Step 2 Use the **cc** command to select the AXSM slot you want to decommission.

Note The AXSM card installed in the slot you are decommissioning must be the same type of card for which the slot was configured. You cannot decommission a slot with an AXSM card type that does not match the configured card type.

Step 3 To display the connections you need to delete, enter the following command:

```
mgx8850a.10.AXSM.a > dspcons
```

The following is a sample **dspcons** display.

```
pop20one.7.PXM.a > dspcons

Local Port         Vpi.Vci   Remote Port        Vpi.Vci    State   Owner
----------------------------+----------------------------+-------+------
10:2.2:2          100 100    Routed            100 100     FAIL        MASTER
Local  Addr: 47.00918100000000107b65f33c.0000010a1802.00
Remote Addr: 47.009181000000002a123f213f.000001011802.00\\
```

Step 4 Write down the interface, VPI, and VCI numbers for each connection. You need these numbers to complete the next step.

Step 5 Delete all connections by entering the following command for each connection:

```
mgx8850a.10.AXSM.a > delcon <ifNum> <VPI> <VCI>
```

Step 6 When all connections are deleted, bring down the interface by entering the following command:

```
mgx8850a.10.AXSM.a > dnport <ifNum>
```

Step 7 To display a list showing the partitions for this card, enter the **dspparts** command.

Step 8 Write down the interface number and partition number for each partition on the card. You will need this information to complete the next step.

Step 9 Delete all resource partitions by entering the following command for each resource partition:

```
mgx8850a.10.AXSM.a > delpart <ifNum> <partId>
```

Replace *ifnum* with the interface number of the port, and replace *partitionID* with the partition number assigned to the port.

Step 10 To verify that the partitions have been deleted, enter the **dspparts** command.

Step 11 To display a list showing the ports configured for this card, enter the **dspports** command.

Step 12 Write down the interface number for each port on the card. You need this information to complete the next step.

Step 13 Delete all ports by entering the following command for each port:

```
mgx8850a.10.AXSM.a > delport <ifNum> <partId>
```

Replace *ifnum* with the interface number of the port.

Step 14 To verify that the ports have been deleted, enter the **dspports** command.

Step 15 To display a list showing the lines that are administratively up, enter the **dsplns** command.

Step 16 Write down the line number for each line that is up. You need will this information to complete the next step.

Step 17 Bring down all lines by entering the following command for each line:

```
mgx8850a.10.AXSM.a > dnln <bay.line>
```

Step 18 To verify that the lines have been brought down, enter the **dsplns** command.

When all lines have been brought down, the slot is decommissioned and you can add an AXSM card of a different type in that slot as described in "Adding AXSM Cards," which appears earlier in this chapter.

Decommissioning an RPM Slot

To decommission an RPM slot, you must remove all configuration items you configured for that card. You can do this by entering each command in the startup-config file with the key word **no** in front of it. These configuration items are described in the *Cisco MGX 8850 Route Processor Module Installation and Configuration Guide*.

Viewing and Responding to Alarms

Cisco MGX 8850 and Cisco MGX 8950 switches display alarm information about the switch cards and store this information inside the switch. This chapter describes how to interpret the alarm LEDs on the switch and how to obtain alarm reports through the CLI.

Viewing and Responding to Alarms Using Physical Switch Controls

The PXM45, AXSM, and RPM cards have LEDs for viewing alarm status and switches for responding to alarms. The following sections describe these controls.

PXM45 Card Controls

Figure 9-1 shows the LEDs and switches available on the front of the PXM45 card. Table 9-1 describes these controls.

Note Although there are LEDs for critical, major, and minor alarms on the PXM45, only one of these LEDs is set to “on” when multiple alarms are active. The switch always displays the status of the most severe alarm. Critical alarms are the most severe, and minor alarms are the least severe. If there were 2 major alarms and 10 minor alarms, the switch would set the major alarm LED to on.

Figure 9-1 PXM45 Front Card Controls

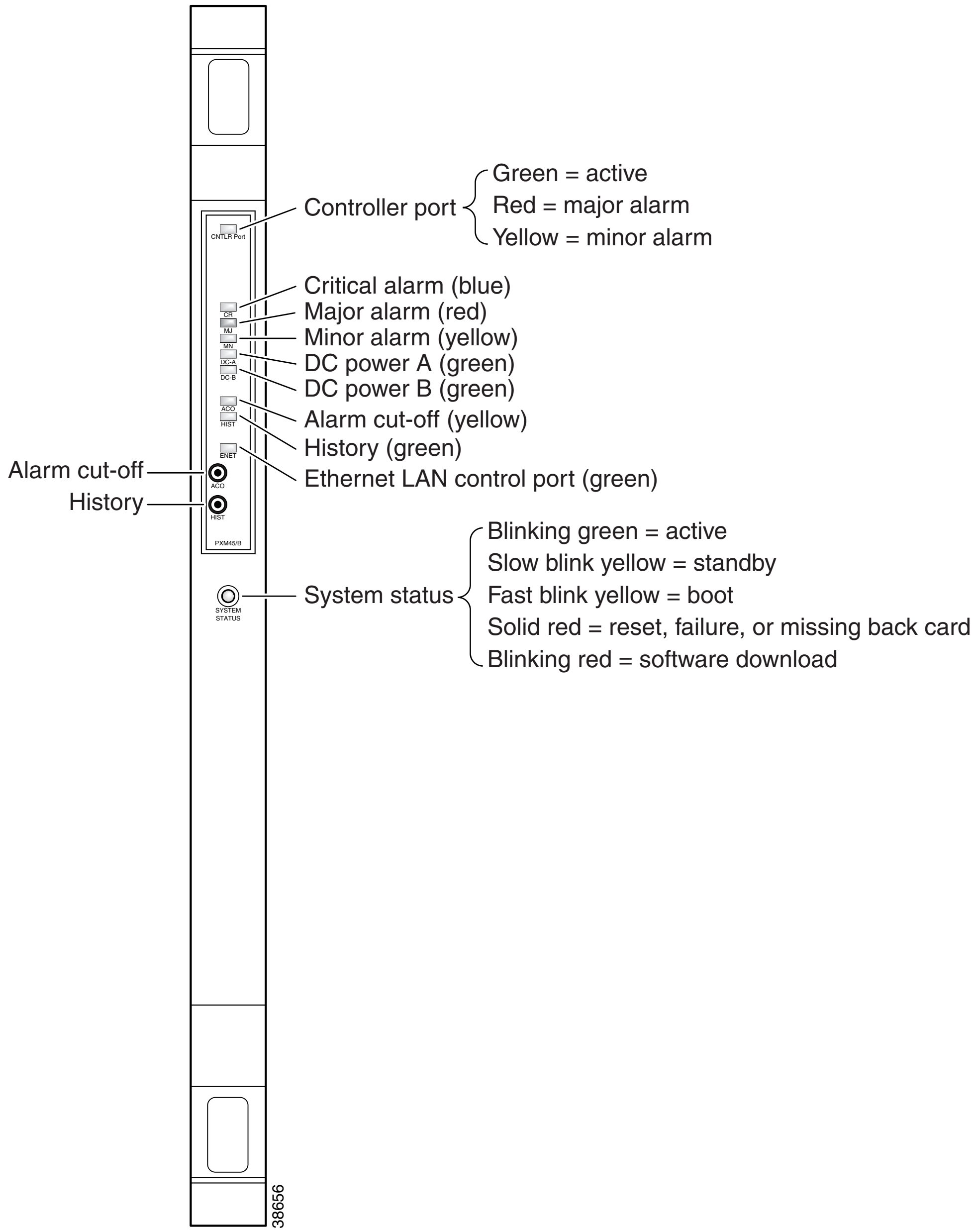


Table 9-1 LED Indicators for PXM45

LED Label	Color	Meaning
CNTRLR Port (Controller Port)	Green	Controller port is active.
	Red	Major alarm on the controller port.
	Yellow	Minor alarm on the controller port.
	None	No light indicates the port has not been activated (upped).

Table 9-1 LED Indicators for PXM45 (continued)

LED Label	Color	Meaning
System Status	Green	Blinking green indicates that the card is in the active state.
	Yellow	Slow blinking yellow indicates that the card is in the standby state.
		Fast blinking yellow indicates that the card is in the boot state.
	Red	Solid red indicates that the card is in the Reset state, the card has failed, or a back card is missing.
		Blinking red indicates that the card is downloading new software.
CR (Critical alarm)	Blue	A critical alarm indicates a condition that results in a loss of service for which the switch cannot correct. For example, when APS redundancy is not present, a broken trunk cable generates a critical alarm. Immediate action is required.
MJ (Major alarm)	Red	A major alarm indicates a component or service failure that currently has minimal impact on service. For example, if one card in a redundant AXSM configuration fails, the good card takes over and the switch displays a major alarm. Urgent action is required to recover the failed component or service.
MN (Minor alarm)	Yellow	A minor alarm indicates a non-service affecting condition that should be corrected. Minor alarms can indicate internal switch failures, such as the failure of a single fan, or external failures that cannot be corrected at the switch.
HIST (History)	Green	Green indicates that a network alarm occurred. Critical and major alarms clear automatically when the problem is resolved. Minor alarms remain lit until cleared with the history button. If there are critical or major alarms in progress, you cannot reset the HIST light. If the card indicates a minor alarm, press the HIST button once to see if the alarm condition has passed. When all alarms are cleared, press the HIST button to turn off the HIST LED.
ACO (Alarm cut-off)	Yellow	Yellow indicates that the ACO switch was pushed to clear the audible alarm indicator, but the alarm condition still exists.
DC-A	Green	Green indicates that the power supplies in tray “A” are functioning.
	None	No light indicates that power supply tray “A” is empty (no power modules).
DC-B	Green	Green indicates that the power supplies in tray “B” are functioning.
	None	No light indicates that power supply tray “B” is empty (no power modules).
ENET (Ethernet)	Green	Blinking green indicates that there is activity on the LAN Control Port.

AXSM Card Controls

Figure 9-2 shows the LEDs available on the front of the AXSM card. Table 9-2 describes these LEDs.

Figure 9-2 AXSM Card Controls (MGX-AXSM-4-622)

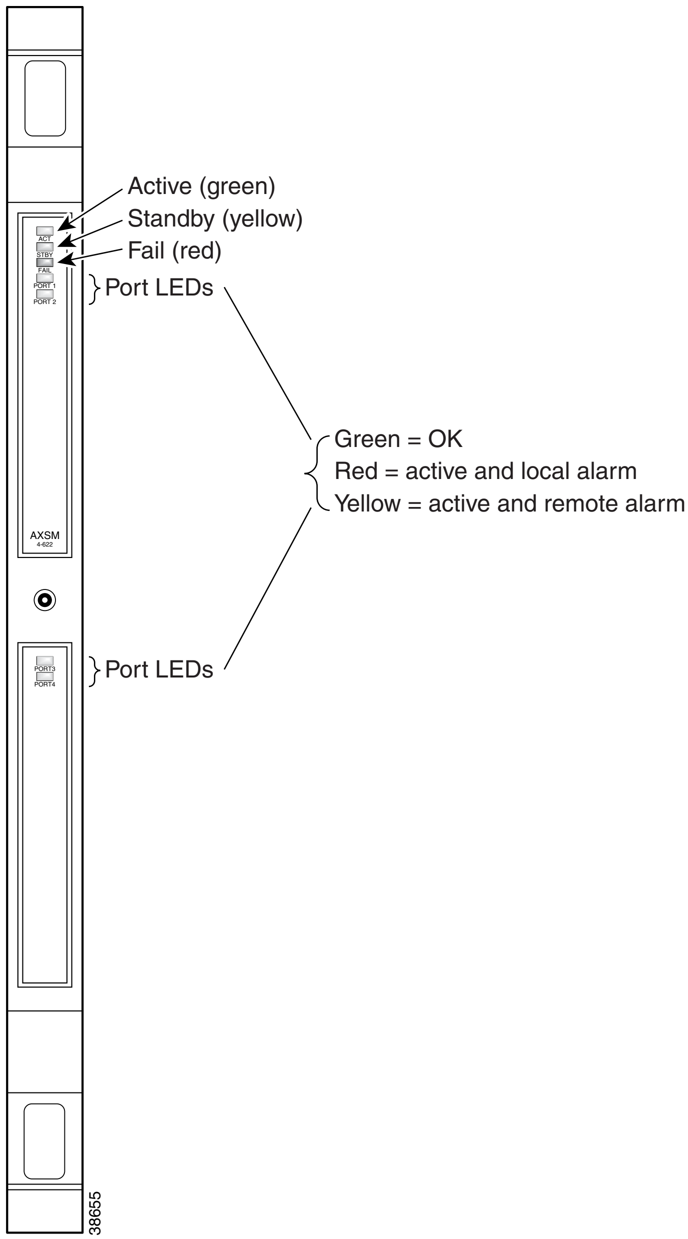


Table 9-2 LED Indicators for AXSM Card

LED	Color	Description
Active	Green	Card is active.
Standby	Yellow	Card is in standby mode.
Fail	Red	Failure detected on card.
PORT	Green	Line is active; there are no alarms.
	Red	Line is active, but a local alarm has been detected.
	Yellow	Line is active; a remote alarm has been detected.

RPM-PR Card Controls

Figure 9-3 shows the LEDs available on the front of the RPM-PR card. Table 9-3 describes these LEDs.

Figure 9-3 RPM-PR Card Controls

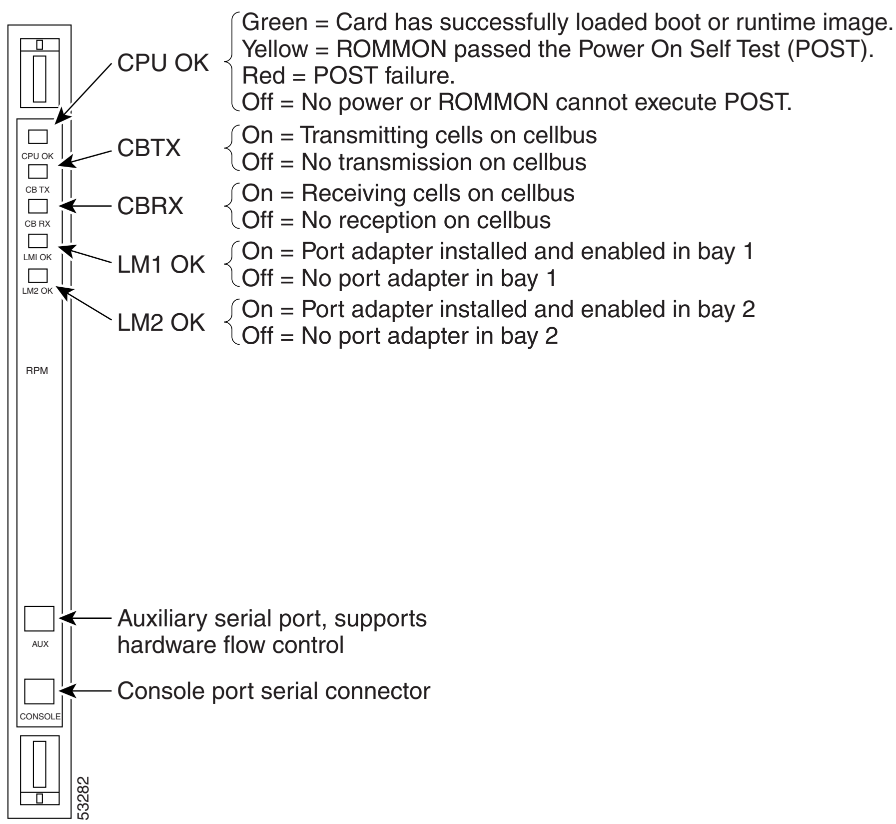


Table 9-3 LED Indicators for RPM-PR Card

LED	Color	Description
CPU OK	Green	RPM-PR has successfully loaded the boot or runtime software.
	Yellow	ROMMON passed the Power On Self-Test (POST).
	Red	POST failure.
	Off	No power or ROMMON cannot execute POST.
CB TX	On	Transmitting cells on cellbus.
	Off	Not transmitting cells on cellbus.
CB RX	On	Receiving cells from cellbus. This light stays on solid when downloading software.
	Off	Not receiving cells from cellbus.
LM1 OK	On	Port adapter installed and enabled in bay 1.
	Off	No port adapter installed in bay 1.
LM2 OK	On	Port adapter installed and enabled in bay 2.
	Off	No port adapter installed in bay 2.

Displaying Alarm Reports in the CLI

You can use a CLI session to view the status of node alarms. Alarms are reported in the following categories:

- Node alarms
- Clock alarms
- Switching alarms
- Environment alarms
- Card alarms

This section describes how to display the different types of alarm reports.

Note The procedures in the following sections can be completed by users at all access levels.

Displaying Node Alarms

A node alarm report displays a summary report of all alarms on the node. To display node alarms, enter the following command:

```
pop20two.7.PXM.a > dspndalms
```

The following is an example of the node alarm report.

```
M8850_LA.7.PXM.a > dspndalms
Node Alarm Summary

Alarm Type                     Critical       Major          Minor
----------                     --------      -------        -------
Clock Alarms                          0            0              0
Switching Alarms                      0            0              3
Environment Alarms                    0            0              0
Card Alarms                           1            4              0
```

Typically, you would start investigating alarms by displaying the node alarms. Once you have identified the area that is producing the alarms, you would enter additional commands to display detailed information on those alarms. The following sections describe how to display these detailed reports.

Displaying Clock Alarms

Cisco MGX 8850 and Cisco MGX 8950 switches monitor the quality of the clock sources. If the timing for a clock source strays beyond the tolerance thresholds, an alarm is reported. To view the clock alarms, enter the following command:

```
pop20two.7.PXM.a > dspclkalms
```

The following is an example clock alarm report:

```
pop20two.7.PXM.a > dspclkalms
pop20two                        System Rev: 02.00   Sep. 02, 2000 23:39:22 GMT
MGX8850                                             Shelf Alarm: NONE
Clock Manager Alarm Summary
----------------------------
Critical       Major          Minor
000            000            000
```

Displaying Switching Alarms

Switching alarms identify problems with the switching components within the switch. To display a report of all switching alarms, enter the following command:

```
pop20two.7.PXM.a > dspswalms
```

The following is a sample report showing no switching alarms.

```
pop20two.7.PXM.a > dspswalms
Node Switching Alarm Summary

Card Crossbar            Critical  0   Major  0   Minor  0
Crossbar Fabric          Critical  0   Major  0   Minor  0
Humvee Alarm             Critical  0   Major  0   Minor  0
```

To display additional information on switch alarms, enter the following commands:

- **dspswalm** <*slot*>
- **dspxbaralms**
- **dspxbarerrcnt**

To display a report for xbar alarms, enter the following command:

```
M8850_NY.7.PXM.a > dspxbaralm
```

The following display is an example xbar alarm report.

```
M8850_NY.7.PXM.a > dspxbaralm
M8850_NY                         System Rev: 02.01   Sep. 18, 2001 07:12:43 PST
MGX8850                                              Node Alarm: NONE
     Slot   Plane         Severity
     ----   -----         --------
        7       0             None
        7       1             None
        7       2             None
        8       0             None
        8       1             None
        8       2             None
```

When the switch reports xbar alarms, you can use the troubleshooting commands in Table 9-4 to collect more information.

Table 9-4 Crossbar Alarm Troubleshooting Commands

Command	Purpose
dspxbar *<slot>* *<plane>*	Displays the following general information about the configuration of a switch plane (or switching fabric or crossbar): • Number of the slot where the crossbar ASIC resides (7 or 8 for a Cisco MGX 8850 node, 9, 10, 25, or 26 for a Cisco MGX 8950 node). • Selected switch plane or ASIC number. The range is 0 to 3. If you do not specify a plane with this command, the default value of 0 is used. • Revision number of the ASIC. • Status of the ASIC.The status is either failed or OK. If the status is failed, the other ASICs must carry the switching load, and the throughput of the switch falls below the maximum. In this case, Cisco Systems recommends you replace the card. The cell grant mode is always “Multicast Preferred.” • The “Resent Sframe Tic” is the rising edge of the clock. “Sframe” refers to a switch frame.
dspxbaralm	Shows whether a crossbar alarm is minor, major, or critical. The display shows status on both the active and standby PXM45.

Table 9-4 Crossbar Alarm Troubleshooting Commands (continued)

Command	Purpose
dspxbarerrcnt	Displays the following types of slot-link errors: • Loss of synchronization between the ASIC and the queuing circuitry on the service module. The synchronization in this case applies to the timing of the internal switching frames (Sframes). Loss of synchronization is a very serious error. • Receiver code violations (Rx Cv column in the display). • Receiver disparity errors (Rx Disp column in the display). A disparity error is a summary of five ASIC-specific alarms. • Transmitter parity errors. • CRC failures for the header or the payload of the 60-byte Sframe. • Failures to remap between slots as needed or excessive remapping between slots (Slot Remap and Slot Recur columns in the display). • Parity errors in back-pressure messages.
dspxbarerrthresh	Displays the thresholds for crossbar errors. The following items that make up a threshold are as follows: • Duration of the errored state • Number of errors during that time period • Upper and lower error counts within a particular alarm severity (minor, major, and critical) Thresholds are displayed for the following errors: • Loss of synchronization (LossOfSync) • Transceiver error (TranscieverErr) • DisparityErr—an accumulation of five ASIC-level errors • ParityErr—a parity error in the switch frame as a whole • HeaderCRCErr—a CRC error for the switch frame header • PayloadCRCErr—a CRC error for the switch frame payload • RemapTwiceErr • RemapRecurrErr • Backpressure parity error (B.P.ParityErr)—a parity error in the signaling for backpressure
dspxbarmgmt	Displays details about the load sharing configuration for the node.
dspxbarstatus	Displays status of each slot for a crossbar.

For more information on these commands, refer to the *Cisco MGX 8850, MGX 8950, and MGX 8830 Command Reference (PXM45/B).*

Displaying Environment Alarms

An environmental alarm report displays the alarm status and operating statistics for the switch power supplies and cooling fans. To display the environmental alarm report, enter the **dspenvalms** command as shown in the following example:

```
pop20two.7.PXM.a > dspenvalms
pop20two                         System Rev: 02.00   Sep. 02, 2000 23:40:57 GMT
MGX8850                                              Shelf Alarm: NONE
ENVIRONMENTAL ALARM STATE INFO   ^Notification Disabled
   Alarm Type      Unit   Threshold      DataType   Value       State
 ----------------  ---- --------------   -------- ---------- -------------
 Temperature            <= 50            Celsius   29        Normal

 Power Supply       A1   none             None      none      Missing
 Power Supply       A2   none             None      none      Missing
 Power Supply       A3   none             None      none      Missing
 DC Voltage         A    42  to 54        VoltsDC   0         Normal

 Power Supply       B1   none             None      none      Missing
 Power Supply       B2   none             None      none      Missing
 Power Supply       B3   none             None      none      Missing
 DC Voltage         B    42  to 54        VoltsDC   0         Normal

 Top Fan Tray       1    >= 2000          RPM       3642      Normal
 Top Fan Tray       2    >= 2000          RPM       3618      Normal
 Top Fan Tray       3    >= 2000          RPM       3714      Normal
 Top Fan Tray       4    >= 2000          RPM       3642      Normal
 Top Fan Tray       5    >= 2000          RPM       3474      Normal

Type <CR> to continue, Q<CR> to stop:
pop20two                         System Rev: 02.00   Sep. 02, 2000 23:40:57 GMT
MGX8850                                              Shelf Alarm: NONE
ENVIRONMENTAL ALARM STATE INFO   ^Notification Disabled
   Alarm Type      Unit   Threshold      DataType   Value       State
 ----------------  ---- --------------   -------- ---------- -------------
 Top Fan Tray       6    >= 2000          RPM       3654      Normal
 Top Fan Tray       7    >= 2000          RPM       3576      Normal
 Top Fan Tray       8    >= 2000          RPM       3468      Normal
 Top Fan Tray       9    >= 2000          RPM       3492      Normal

 Bottom Fan Tray    1    >= 2000          RPM       0         Missing
 Bottom Fan Tray    2    >= 2000          RPM       0         Missing
 Bottom Fan Tray    3    >= 2000          RPM       0         Missing
 Bottom Fan Tray    4    >= 2000          RPM       0         Missing
 Bottom Fan Tray    5    >= 2000          RPM       0         Missing
 Bottom Fan Tray    6    >= 2000          RPM       0         Missing
 Bottom Fan Tray    7    >= 2000          RPM       0         Missing
 Bottom Fan Tray    8    >= 2000          RPM       0         Missing
 Bottom Fan Tray    9    >= 2000          RPM       0         Missing

 +5V Input             4.850^ to 5.150^   VoltsDC   5.036     Informational
 +3.3V Input           3.200^ to 3.400^   VoltsDC   3.298     Informational

Type <CR> to continue, Q<CR> to stop:
pop20two                         System Rev: 02.00   Sep. 02, 2000 23:40:57 GMT
MGX8850                                              Shelf Alarm: NONE
ENVIRONMENTAL ALARM STATE INFO   ^Notification Disabled
   Alarm Type      Unit   Threshold      DataType   Value       State
 ----------------  ---- --------------   -------- ---------- -------------
 +2.5V Input           2.425^ to 2.575^   VoltsDC   2.479     Informational
 Calibration VDC        0x7e^ to 0x82^    Other     0x80      Informational
```

Displaying Card Alarms

A card alarm report can display the alarm status of all the cards within the node or the alarm status of a single card. To display card alarms, enter the following command:

```
pop20two.7.PXM.a > dspcdalms [slot]
```

Replace [*slot*] with the number of the card for which you want to display alarms. If you omit the slot number, the switch displays the alarms for all cards in the node as shown in the following example:

```
M8850_LA.7.PXM.a > dspcdalms
Card Alarm Summary

Slot  Critical   Major     Minor   ||  Slot  Critical   Major     Minor
----  --------  -------   -------  ||  ----  --------  -------   -------
 1          1        0         0   ||  17          0        0         0
 2          0        0         0   ||  18          0        0         0
 3          0        0         0   ||  19          0        0         0
 4          0        0         0   ||  20          0        0         0
 5          0        0         0   ||  21          0        0         0
 6          0        0         0   ||  22          0        0         0
 7          0        0         0   ||  23          0        0         0
 8          0        0         0   ||  24          0        0         0
 9          0        0         0   ||  25          0        0         0
10          0        0         0   ||  26          0        0         0
11          0        0         0   ||  27          0        0         0
12          0        0         0   ||  28          0        0         0
13          0        0         0   ||  29          0        0         0
14          0        0         0   ||  30          0        0         0
15          0        1         0   ||  31          0        1         0
16          0        1         0   ||  32          0        1         0

Use dspcdalms <slot> to see more detail.
```

The next example shows a card alarm report for an AXSM card in slot 1:

```
M8850_LA.7.PXM.a > dspcdalms 1
Card Alarm Summary


Alarm Type                  Critical        Major          Minor
----------                  --------       -------        -------
Hardware Alarm                     0             0              0
Card State Alarm                   0             0              0
Disk Alarm                         0             0              0
SRM Alarm                          0             0              0
Line Alarm                         1             0              0
Port Alarm                         0             0              0
Feeder Alarm                       0             0              0
Channel Alarm                      0             0              0
```

Table 9-5 lists commands that you can use to display additional information about alarms that appear in the **dspcdalms** report.

Table 9-5 Card Alarm Information Commands

Alarm Type	Commands
Card state	**dspcd** <slot>
Channel or Connection	**dspconalarms** **dspcons** **dspcon**
Feeder	**dspfdrs** **dspfdr**
Line	**dspalms** **dsplns** **dspln** **dspapslns** **dspapsln**
Port	**dspports** **dsppnports**

Displaying Log File Information

Log files record switch events such as operator login and command entry. To view the contents of the current log, enter the following command:

```
pop20two.7.PXM.a > dsplog [-log <number>] [-mod moduleName] [-sev <number>] [-sl <slot>]
[-task <taskName>] [-tge <MM/DD/YYYY-HH:MM:SS>] [-tle <MM/DD/YYYY-HH:MM:SS>]
```

To display a list of archived log files, enter the following command:

```
pop20two.7.PXM.a > dsplogs
```

The log files are stored in the C:/LOG directory.

APPENDIX A

Downloading and Installing Software Upgrades

This appendix describes how to locate, download, and install software updates for the switch. Because software updates are stored in the switch file system, this appendix includes a section on browsing the file system. This appendix includes the following sections:

- Upgrade Process Overview
- Quickstart Procedures for Software Upgrades
- Quickstart Procedures for Software Downgrades
- Browsing the File System
- Locating Software Updates
- Copying Software Files to the Switch
- Upgrade Procedures for PXM45, AXSM, and FRSM-12 Cards
- Upgrade Procedures for RPM-PR Cards
- Upgrading SCT Files
- Troubleshooting Upgrade Problems

Upgrade Process Overview

This appendix provides a series of quickstart procedures that describe how to perform graceful and non-graceful upgrades to the switch. To perform a graceful upgrade on a switch card, the card must be operating in redundant mode with another switch card of the same type. When performed properly, graceful upgrades have minimal impact on connections in progress and do not interrupt any established connections.

Note Graceful upgrades to Release 3.0 are supported from Releases 2.0.16 and 2.1.15.

When a card to be upgraded is not operating in redundant mode, you must do a non-graceful upgrade, which disrupts all traffic that passes through the card. For PXM45 cards, an ungraceful upgrade interrupts all traffic passing through the switch. For all other types of cards, an ungraceful upgrade affects only the traffic that passes through that card.

When you upgrade the software in a switch, you should refer to the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3* for the latest information. Each type of switch card runs boot and runtime software. The recommended sequence for upgrading the software on switch cards is as follows:

1. PXM45 boot software
2. PXM45 runtime software
3. AXSM and FRSM-12 boot software
4. AXSM and FRSM-12 runtime software
5. RPM-PR boot software
6. RPM-PR runtime software

Note If you plan to upgrade PXM45 cards and AXSM or FRSM-12 cards, upgrade the PXM45 cards first. Wait until the PXM45 cards are operating in active and standby modes with the correct software before upgrading AXSM or FRSM-12 cards. The software version used by the PXM45/B cards should be equal to or later than the version used on the AXSM, AXSM/B, AXSM-E. AXSM-32-E, or FRSM-12 cards.

Typically, the boot software requires less frequent upgrades. Some upgrades might only require updates to one type of switch card. The *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3* should explain which software components require upgrading.

When you upgrade the software on a switch card, proceed as follows:

- Decide whether you are performing a graceful or non-graceful upgrade
- Follow the appropriate quickstart procedure for that type of upgrade
- For additional information on a task within a quickstart procedure, see the appendix section to which the procedure refers

The next section presents the quickstart procedure for switch card software upgrades.

Quickstart Procedures for Software Upgrades

The following sections provide quickstart procedures for the following upgrades:

- Graceful PXM45 Boot Upgrades
- Non-Graceful PXM45 Boot Upgrades
- Graceful PXM45, AXSM, and FRSM-12 Runtime Software Upgrades
- Non-Graceful PXM45, AXSM, and FRSM-12 Runtime Software Upgrades
- Graceful AXSM or FRSM-12 Boot Upgrades
- Non-Graceful AXSM Boot Upgrades
- Graceful RPM-PR Boot Software Upgrades
- Graceful RPM-PR Runtime Software Upgrades
- Non-Graceful RPM-PR Boot Software Upgrades
- Non-Graceful RPM-PR Runtime Software Upgrades
- Installing SCT Files

Graceful PXM45 Boot Upgrades

When performed properly, graceful upgrades have minimal impact on connections in progress and do not interrupt any established connections.

When a boot software upgrade is required, the procedure for upgrading redundant PXM45 cards is as follows:

1. Manually upgrade the boot software on the standby PXM45.
2. Switch cards to make the upgraded standby card active.
3. After the standby card becomes the active card, manually upgrade the non-active card.

This process ensures a smooth transition to the new software and preserves all established calls. During the short period when the roles of the active and standby cards are switched, all calls that are not established are lost.

Note Avoid making configuration changes while upgrading PXM45 software. Configuration changes can be lost when the PXM45 is reset during the upgrade.

To upgrade the runtime software, use the following procedure.

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch. See the "Copying Software Files to the Switch" section, which appears later in this appendix.
Step 2	*username* *password*	Establish a CLI session with the *standby* PXM45 card using the CP port on the UI-S3 back card and a user name with CISCO_GP privileges.
Step 3	**saveallcnf**	This optional step saves the current configuration to the hard disk. See the "Saving a Configuration" section in Chapter 7, "Switch Operating Procedures."
Step 4	**sh** **sysBackupBoot** **<Return>** (2.0.11 and earlier)	Change to the PXM45 backup boot mode. **Note** The software versions 2.0.11 and earlier require you to press **Return** during the reboot sequence to enter backup boot mode. See the "Changing to PXM45 Backup Boot Mode" section in Appendix B, "PXM45 Backup Boot Procedures."
Step 5	**sysPxmRemove**	At the backup boot prompt, enter the **sysPxmRemove** command. This step prevents the active card from resetting the standby card while you are working with it.
Step 6	**sysFlashBootBurn** "*Filename*" **reboot** *username* *password* **dspcd**	Burn the boot code. Remember to enter quotation marks before and after the boot software filename. For example: `sysFlashBootBurn "C:FW/pxm45_003.000.000.000_bt.fw"` See the "Upgrading PXM45 Boot Software" section, which appears later in this appendix.

	Command	Purpose
Step 7	*username* *password*	Establish a CLI session with the *active* PXM45 card (which is the non-upgraded card) using the CP port on the UI-S3 back card and a user name with CISCO_GP privileges.
Step 8	**switchcc** **y**	Switch the roles of the active and standby cards so you can upgrade the non-upgraded card in standby mode.
Step 9	**sh** **sysBackupBoot** **<Return>** (2.0.11 and earlier)	Change to the PXM45 backup boot mode. **Note** The software versions 2.0.11 and earlier require you to press **Return** during the reboot sequence to enter backup boot mode. See the "Changing to PXM45 Backup Boot Mode" section in Appendix B, "PXM45 Backup Boot Procedures.".
Step 10	**sysPxmRemove**	At the backup boot prompt, enter the **sysPxmRemove** command. This step prevents the active card from resetting the standby card while you are working with it.
Step 11	**sysFlashBootBurn** "*Filename*" **reboot** *username* *password* **dspcd**	Burn the boot code. Remember to enter quotation marks before and after the boot software filename. For example: `sysFlashBootBurn "C:FW/pxm45_003.000.000.000_bt.fw"` See the "Upgrading PXM45 Boot Software" section, which appears later in this appendix. Both active and standby cards should now be upgraded. The card that was active before the upgrade is now operating in standby mode.

Non-Graceful PXM45 Boot Upgrades

Ungraceful upgrades disrupt all switch traffic and are usually used in lab installations where the use of standalone cards provides no opportunity for a graceful upgrade. The quickstart procedure is provided as an overview and as a quick reference for those who have already performed ungraceful upgrades on the switch.

Note Avoid making configuration changes while upgrading PXM45 software. Configuration changes can be lost when the PXM45 is reset during the upgrade.

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch. See the "Copying Software Files to the Switch" section, which appears later in this appendix.
Step 2	*username* *password*	Establish a CLI session with the active PXM45 card using the CP port on the UI-S3 back card and a user name with CISCO_GP privileges.

	Command	Purpose
Step 3	**saveallcnf**	This optional step saves the current configuration to the hard disk. See the "Saving a Configuration" section in Chapter 7, "Switch Operating Procedures."
Step 4	**sh** **sysBackupBoot** **<Return>** (2.0.11 and earlier)	Change to the PXM45 Backup Boot mode. Note that the software versions 2.0.11 and earlier require you to press **Return** during the reboot sequence to enter backup boot mode. See the "Changing to PXM45 Backup Boot Mode" section in Appendix B, "PXM45 Backup Boot Procedures."
Step 5	**sysPxmRemove**	If there are two PXM45 cards installed in the switch, enter the **sysPxmRemove** command to prevent the active card from resetting the standby card while you are working with it.
Step 6	**sysFlashBootBurn** "*Filename*" **reboot** *username* *password* **dspcd**	Burn the boot code. Remember to enter quotation marks before and after the boot software filename. For example: `sysFlashBootBurn "C:FW/pxm45_003.000.000.000_bt.fw"` See the "Upgrading PXM45 Boot Software" section, which appears later in this appendix.

Graceful PXM45, AXSM, and FRSM-12 Runtime Software Upgrades

When performed properly, graceful upgrades have minimal impact on connections in progress and do not interrupt any established connections.

This quickstart procedure applies to PXM45, AXSM, and FRSM-12 cards. Use the procedure to perform the following tasks:

1. Loads the new software on the standby PXM45, AXSM, or FRSM-12 card.
2. Makes the standby card active.
3. Loads the new software on the formerly active (now standby) card.

Note If you plan to upgrade PXM45 cards and AXSM or FRSM-12 cards, upgrade the PXM45 cards first. Wait until the PXM45 cards are operating in active and standby modes with the correct software before upgrading AXSM or FRSM-12 cards. The software version used by the PXM45/B cards should be equal to or later than the version used on the AXSM, AXSM/B, AXSM-E, AXSM-32-E, and FRSM-12 cards. When AXSM or FRSM-12 boot software is to be upgraded, it should be upgraded before upgrading the runtime software.

Caution Avoid making configuration changes while upgrading PXM45 software. Configuration changes can be lost when the PXM45 is reset during the upgrade. While graceful upgrades can be aborted with the **abortrev** command, the **abortrev** command does reset both active and standby cards, so reverting back to an earlier software release is non-graceful.

Note Cisco Systems recommends that you upgrade software on one AXSM or FRSM-12 card at a time within a switch. Wait until each AXSM or FRSM-12 card upgrade is complete before starting an upgrade on another AXSM or FRSM-12 card.

To upgrade the runtime software, use the following procedure.

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch. See the "Copying Software Files to the Switch" section, which appears later in this appendix.
Step 2		If the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3* call for a boot software upgrade, upgrade the boot software for the card you are upgrading. PXM45 cards should be upgraded first. See the "Graceful PXM45 Boot Upgrades" section, which appears earlier in this appendix. For instructions on upgrading AXSM or FRSM-12 boot software, see the "Graceful AXSM or FRSM-12 Boot Upgrades" section, which appears later in this appendix.
Step 3	*username* *password*	Establish a CLI session with the active PXM45 card using a user name with SERVICE_GP privileges.
Step 4	**saveallcnf**	This optional step saves the current configuration to the hard disk. See the "Saving a Configuration" section in Chapter 7, "Switch Operating Procedures."
Step 5	**dspcd** **commitrev** <*slot*> <*revision*>	Verify that all previous upgrades have been committed. If a previous upgrade is not committed, commit to the new upgrade. See the "Committing to a Runtime Software Upgrade" section, which appears later in this appendix.
Step 6	**loadrev** <*slot*> <*revision*> **dspcd**	Load the new runtime software on the standby PXM45.

	Command	Purpose
Step 7	**runrev** <*slot*> <*revision*> **dspcd** **dspcd** <*slot*>	Switch over to the standby PXM45 card and load the new runtime software on the new standby (non-upgraded) PXM45.
Step 8	**commitrev** <*slot*> <*revision*>	This command prevents an accidental switch back to a previous software revision if someone enters the **abortrev** command. Enter the **commitrev** command after the former active PXM45 comes up in the standby-U state. Cisco Systems recommends that you avoid configuration changes until after you have run the **commitrev** or **abortrev** commands. See the "Aborting a Runtime Software Upgrade" section and the "Committing to a Runtime Software Upgrade" section, both of which appear later in this appendix.

Non-Graceful PXM45, AXSM, and FRSM-12 Runtime Software Upgrades

Ungraceful upgrades disrupt all switch traffic and are usually used in lab installations where the use of standalone cards provides no opportunity for a graceful upgrade. The quickstart procedure is provided as an overview and as a quick reference for those who have already performed ungraceful upgrades on the switch.

Note If you plan to upgrade PXM45 cards and AXSM or FRSM-12 cards, upgrade the PXM45 cards first. Wait until the PXM45 cards are operating in active and standby modes with the correct software before upgrading AXSM or FRSM-12 cards. The software version used by the PXM45/B cards should be equal to or later than the version used on the AXSM, AXSM/B, AXSM-E, AXSM-32-E, or FRSM-12 cards. When AXSM or FRSM-12 boot software is to be upgraded, it should be upgraded before upgrading the runtime software.

Note Avoid making configuration changes while upgrading PXM45 software. Configuration changes can be lost when the PXM45 is reset during the upgrade.

Note Cisco Systems recommends that you upgrade software on one AXSM or FRSM-12 card at a time within a switch. Wait until each AXSM or FRSM-12 card upgrade is complete before starting an upgrade on another AXSM or FRSM-12 card.

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch. See the "Copying Software Files to the Switch"section, which appears later in this appendix.
Step 2		If the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3* call for a boot software upgrade, upgrade the boot software as described in the "Non-Graceful PXM45 Boot Upgrades" section, which appears earlier in this appendix, or the "Non-Graceful AXSM Boot Upgrades" section, which appears later in this appendix.
Step 3	*username* *password*	Establish a CLI session with the active PXM45 card using a user name with SERVICE_GP privileges.
Step 4	**saveallcnf**	This optional step saves the current configuration to the hard disk. see the "Saving a Configuration" section in Chapter 7, "Switch Operating Procedures."
Step 5	**dspcd** **commitrev** <*slot*> <*revision*>	Verify that all previous upgrades are committed. If a previous upgrade is not committed, commit to the new upgrade. See the "Committing to a Runtime Software Upgrade" section, which appears later in this appendix.
Step 6	**loadrev** <*slot*> <*revision*> **dspcd**	Define the new software version to be used.
Step 7	**runrev** <*slot*> <*revision*> **dspcd**	Reset the card and run the new software version.
Step 8	**commitrev** <*slot*> <*revision*>	This command prevents an accidental switch back to a previous software revision if someone enters the **abortrev** command. Enter the **commitrev** command after the former active PXM45 comes up in the standby-U state. Cisco Systems recommends that you avoid configuration changes until after you have run the **commitrev** or **abortrev** commands. See the "Aborting a Runtime Software Upgrade" section and the "Committing to a Runtime Software Upgrade" section, both of which appear later in this appendix.

Graceful AXSM or FRSM-12 Boot Upgrades

When performed properly, graceful upgrades have minimal impact on connections in progress and do not interrupt any established connections. The quickstart procedure is provided as an overview and as a quick reference for those who have already performed ungraceful upgrades on the switch.

Note If you plan to upgrade PXM45 cards and AXSM or FRSM-12 cards, upgrade the PXM45 cards first. Wait until the PXM45/B cards are operating in active and standby modes with the correct software before upgrading AXSM or FRSM-12 cards. The software version used by the PXM45/B cards should be equal to or later than the version used on the AXSM, AXSM/B, AXSM-E, AXSM-32-E, and FRSM-12 cards.

Note Cisco Systems recommends that you upgrade software on one AXSM or FRSM-12 card at a time within a switch. Wait until each AXSM or FRSM-12 card upgrade is complete before starting an upgrade on another AXSM or FRSM-12 card.

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch. See the "Copying Software Files to the Switch" section, which appears later in this appendix.
Step 2	*username* *password*	Establish a CLI session with the *active* PXM45 card using a user name with SERVICE_GP privileges or higher.
Step 3	**saveallcnf**	This optional step saves the current configuration to the hard disk. See the "Saving a Configuration" section in Chapter 7, "Switch Operating Procedures."
Step 4	**burnboot** <*slot*> <*revision*> **dspcd** <*slot*>	Burn the boot software on the standby AXSM card by specifying the slot number of the standby card. For example: `M8850_LA.7.PXM.a > burnboot 1 3.0(0.0)` See the "Upgrading Boot Software on an AXSM or FRSM-12 Card" section, which appears later in this appendix.
Step 5	**switchredcd** <*fromSlot*> <*toSlot*>	Activate the upgraded card and place the non-upgraded card in standby mode.
Step 6	**burnboot** <*slot*> <*revision*> **dspcd** <*slot*>	Burn the boot software on the non-upgraded, standby AXSM card by specifying the slot number of the standby card. See the "Upgrading Boot Software on an AXSM or FRSM-12 Card" section, which appears later in this appendix.

Non-Graceful AXSM Boot Upgrades

Ungraceful upgrades disrupt all switch traffic and are usually used in lab installations where the use of standalone cards provides no opportunity for a graceful upgrade. The quickstart procedure is provided as an overview and as a quick reference for those who have already performed ungraceful upgrades on the switch.

Note If you plan to upgrade PXM45 cards and AXSM cards, upgrade the PXM45 cards first. Wait until the PXM45 cards are operating in active and standby modes with the correct software before upgrading AXSM cards. The software version used by the PXM45/B cards should be equal to or later than the version used on the AXSM, AXSM/B, and AXSM-E cards.

Note Cisco Systems recommends that you upgrade software on one AXSM or FRSM-12 card at a time within a switch. Wait until each AXSM or FRSM-12 card upgrade is complete before starting an upgrade on another AXSM or FRSM-12 card.

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch. See the "Copying Software Files to the Switch" section, which appears later in this appendix.
Step 2	*username* *password*	Establish a CLI session with the *active* PXM45 card using a user name with SERVICE_GP privileges or higher.
Step 3	**saveallcnf**	This optional step saves the current configuration to the hard disk. See the "Saving a Configuration" section in Chapter 7, "Switch Operating Procedures."
Step 4	**burnboot** <*slot*> <*revision*> **dspcd** <*slot*>	Burn the boot software on the standby AXSM or FRSM-12 card by specifying the slot number of the standby card. For example: `M8850_LA.7.PXM.a > burnboot 1 3.0(0.0)` See the "Upgrading Boot Software on an AXSM or FRSM-12 Card" section, which appears later in this appendix.

Graceful RPM-PR Boot Software Upgrades

The RPM-PR card supports graceful boot software upgrades when 1:n redundancy is established in the switch between RPM-PR cards. Boot software is generally upgraded less often than runtime software, so be sure to compare the recommended boot software version with the boot software running on your RPMs before starting an upgrade. The correct boot software might already be installed.

The following quickstart procedure describes how to upgrade redundant RPM-PR cards.

Note Redundancy must be established before you use this procedure. If redundancy has not been configured between two RPM-PR cards, upgrade each RPM-PR card using the procedure in "Non-Graceful RPM-PR Boot Software Upgrades," which appears later in this chapter. To add redundancy to an RPM-PR card, see the "Establishing Redundancy Between Two RPM-PR Cards" section in Chapter 5, "Preparing RPM-PR Cards for Operation."

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch (E:RPM). See the "Copying Software Files to the Switch" section later in this appendix.
Step 2	*username* *password*	Establish a CLI session with the *active* PXM45 card using a user name at any access level.

	Command	Purpose
Step 3	**cc** <*primarySlot*>	Select the slot in which the primary RPM-PR card is installed.
Step 4	**enable** *password*	Enter Enable mode for the router.
Step 5	**dir e:**	Verify router access to the PXM45 hard disk and the boot upgrade software.
Step 6	**show flash:**	Display current contents of bootflash.
Step 7	**copy** *filename* **bootflash:** **dir bootflash:**	Copy the upgrade boot software to flash. For example: `copy e:rpm-boot-mz_002.001.060.000 bootflash:`
Step 8	**config terminal** **boot bootldr bootflash:***filename* **^Z** **show bootvar**	Configure the BOOTLDR variable to specify the new boot software.
Step 9	**copy bootflash:***filename* **c:***filename* **del bootflash:***filename* **show flash:** **squeeze flash:**	Reorganize files in bootflash. The switch always attempts to load the first bootable file in bootflash. If the BOOTLDR variable is not set, the new boot software must be the first file listed in the **show flash:** display. Copy files you want to save to the c: directory and delete all files that appear before the new boot software. Files are marked with the **del** command and actually deleted with the **squeeze flash:** command. **Caution** Verify that at least one valid boot or runtime image will not be deleted. If all boot and runtime images are deleted from bootflash, the RPM-PR card must be returned to the factory for repair.
Step 10	**switchredcd** <*primarySlot*> <*secondarySlot*>	This step makes the secondary card active and resets the primary RPM-PR card. When the primary card resets, it loads the upgraded boot software from bootflash.
Step 11	**cc** <*secondarySlot*>	Select the slot in which the secondary RPM-PR card is installed.

	Command	Purpose
Step 12	**enable** *password* **dir e:** **show flash:** **copy** *filename* **bootflash:** **dir bootflash:** **config terminal** **boot bootldr bootflash:***filename* **^Z** **show bootvar** **copy bootflash:***filename* **c:***filename* **del bootflash:***filename* **show flash:** **squeeze flash:**	Repeat Steps 4 through 9 to move the upgraded boot software into bootflash.
Step 13	**switchredcd** <*secondarySlot*> <*primarySlot*>	This step makes the upgraded primary card active and resets the secondary RPM-PR card. When the secondary card resets, it loads the upgraded boot software from bootflash. Both primary and secondary cards should now be using upgraded boot software.
Step 14	—	If there are other primary RPM-PR cards that need upgrading, repeat the part of this procedure that upgrades the primary card, then enter the **switchredcd** command once to reload the primary card. Finally, enter the **switchredcd** command a second time to make the upgraded primary card active.

Graceful RPM-PR Runtime Software Upgrades

The RPM-PR card supports graceful upgrades when 1:n redundancy is established in the switch between RPM-PR cards.

The following quickstart procedure describes how to gracefully upgrade redundant RPM-PR cards.

Note Redundancy must be established before you use this procedure. If redundancy has not been configured between two RPM-PR cards, upgrade each RPM-PR card as described in "Non-Graceful RPM-PR Runtime Software Upgrades," which appears later in this chapter. To add redundancy to an RPM-PR card, see the "Establishing Redundancy Between Two RPM-PR Cards" section in Chapter 5, "Preparing RPM-PR Cards for Operation."

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch (E:RPM). See the "Copying Software Files to the Switch" section, which appears later in this appendix.
Step 2	**copy**	This step is optional. Copy and rename the runtime file to a generic name for easy updates. See the "Non-Graceful RPM-PR Runtime Software Upgrades" section, which appears later in this chapter. **Note** If you have already configured the RPM-PR to use a generic name, you can skip to Step 12.
Step 3	*username* *password*	Establish a CLI session with the *active* PXM45 card using a user name at any access level.
Step 4	**cc** <*primarySlot*>	Select the slot in which the primary RPM-PR card is installed.
Step 5	**enable** *password*	Enter Enable mode for the router.
Step 6	**show bootvar**	Display the current runtime software filename.
Step 7	**config terminal**	Enter the router global configuration mode.
Step 8	**no boot system**	Remove the entire boot list. To remove a single file from the boot list, include a filename. For example: `Router(config)# no boot system c:rpm-js-mz_122-4.T`
Step 9	**boot system c:***filename*	Add the new router runtime image to the boot list. For example: `Router(config)# boot system c:rpm-js-mz_122-4.T`
Step 10	**boot config** e**:auto_config_RPM-PR_***slot#*	Configure the RPM-PR card to store its configuration on the PXM45 hard disk. **Note** This step only needs to be performed once. If this command is already in the startup configuration file, you do not need to enter it again.
Step 11	**^Z**	Exit global configuration mode.
Step 12	**copy run start**	Save the new configuration. **Note** If you omit this step, the RPM-PR card will continue to use the previous version of software.
Step 13	**show bootvar**	Verify the change in the runtime software filename.
Step 14	**softswitch** <*primarySlot*> <*secondarySlot*>	This step makes the secondary card active and resets the primary RPM-PR card. When the primary card resets, it loads the upgraded boot software from bootflash.

	Command	Purpose
Step 15	**softswitch** <*secondarySlot*> <*primarySlot*>	This step makes the upgraded primary card active and resets the secondary RPM-PR card. When the secondary card resets, it loads the upgraded boot software from bootflash. Both primary and secondary cards should now be using upgraded runtime software.
Step 16	—	If there are other primary RPM-PR cards that need upgrading, repeat the part of this procedure that upgrades the primary card, then enter the **softswitch** command once to reload the primary card. Finally, enter the **softswitch** command a second time to make the upgraded primary card active.

Non-Graceful RPM-PR Boot Software Upgrades

Use the non-graceful upgrade procedure in this section when you need to upgrade RPM-PR boot software and the RPM-PR is operating in standalone mode. Non-graceful upgrades terminate all connections and disrupt service until the upgrade procedure is complete.

Note If the RPM-PR is operating in 1:N redundancy mode with another RPM-PR, upgrade the cards as described in "Graceful RPM-PR Boot Software Upgrades," which appears earlier in this chapter.

The following quickstart procedure is provided as an overview and as a quick reference for those who have already performed RPM-PR upgrades on the switch. For detailed instructions, see the "Upgrade Procedures for RPM-PR Cards" section, which appears later in this appendix.

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch (E:RPM). See the "Copying Software Files to the Switch" section later in this appendix.
Step 2	*username* *password*	Establish a CLI session with the *active* PXM45 card using a user name at any access level.
Step 3	**cc** <*RPM_Slot*>	Select the slot in which the RPM-PR card is installed.
Step 4	**enable** *password*	Enter Enable mode for the router.
Step 5	**dir e:**	Verify router access to the hard disk and the boot upgrade software.
Step 6	**show flash:**	Display current contents of bootflash.
Step 7	**copy** *filename* **bootflash:** **dir bootflash:**	Copy the upgrade boot software to flash. For example: `copy e:rpm-boot-mz_002.001.000.000 bootflash:`

	Command	Purpose
Step 8	**config terminal** **boot bootldr bootflash:***filename* **^Z** **show bootvar**	Configure the BOOTLDR variable to specify the new boot software.
Step 9	**copy bootflash:***filename* **c:***filename* **del bootflash:***filename* **show flash:** **squeeze flash:**	Reorganize files in bootflash. The switch always attempts to load the first bootable file in bootflash. If the BOOTLDR variable is not set, the new boot software must be the first file listed in the **show flash:** display. Copy files you want to save to the c: directory and delete all files that appear before the new boot software. Files are marked with the **del** command and actually deleted with the **squeeze flash:** command. **Caution** Verify that at least one valid boot or runtime image will not be deleted. If all boot and runtime images are deleted from bootflash and the card is reset, the RPM-PR card must be returned to the factory for repair.
Step 10	**cc** <*active_PXM_slot*> **resetcd** <*RPM_Slot*>	This command sequence restarts the RPM-PR card with the new boot image.

Non-Graceful RPM-PR Runtime Software Upgrades

Use the non-graceful upgrade procedure in this section when you need to upgrade RPM-PR runtime software and the RPM-PR is operating in standalone mode. Non-graceful upgrades terminate all connections and disrupt service until the upgrade procedure is complete.

Note If the RPM-PR is operating in 1:N redundancy mode with another RPM-PR, upgrade the cards as described in the "Graceful RPM-PR Runtime Software Upgrades" section, which appears earlier in this chapter.

The following quickstart procedure is provided as an overview and as a quick reference for those who have already performed RPM-PR upgrades on the switch. For detailed instructions, see the "Upgrade Procedures for RPM-PR Cards" section, which appears later in this appendix.

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch (E:RPM). See the "Copying Software Files to the Switch" section, which appears later in this appendix.
Step 2	**copy**	Copy and rename the runtime file to a generic name for easy updates. See the "Non-Graceful RPM-PR Runtime Software Upgrades" section, which appears later in this chapter. **Note** If you have already configured the RPM-PR to use a generic name, you can skip to Step 12.
Step 3	*username* *password*	Establish a CLI session with the *active* PXM45 card using a user name at any access level.
Step 4	**cc** <*RPM-PR_Slot*>	Select the slot in which the RPM-PR card is installed.
Step 5	**enable** *password*	Enter Enable mode for the router.
Step 6	**show bootvar**	Display the current runtime software filename.
Step 7	**config terminal**	Enter the router global configuration mode.
Step 8	**no boot system**	Remove the entire boot list. To remove a single file from the boot list, include a filename. For example: `Router(config)# no boot system c:rpm-js-mz_122-4.T`
Step 9	**boot system e:***filename*	Add the new router runtime image to the boot list. For example: `Router(config)# boot system e:rpm-js-mz.122-4.T`
Step 10	**boot config** e**:auto_config_RPM-PR_***slot#*	Configure the RPM-PR card to store its configuration on the PXM45 hard disk. **Note** This step only needs to be performed once. If this command is already in the startup configuration file, you do not need to enter it again.
Step 11	**^Z** **copy run start**	Exit global configuration mode and save the new configuration.
Step 12	**show bootvar**	Verify the change in the runtime software filename.
Step 13	**cc** <*active_PXM45_slot*> **resetcd** <*RPM-PR_Slot*>	This command sequence selects the active PXM45 card and restarts the RPM-PR card with the new runtime image.
Step 14	**dspcds** **dspcd** <*RPM-PR_Slot*> **cc** <*RPM-PR_Slot*>	Verify router reboot is complete.

Installing SCT Files

Use the procedure in this section when you need to manually install or upgrade SCT files.

If you are using CWM to install or upgrade SCT files in your network, refer to the Cisco WAN Manager User's Guide, Release 11

Note The following quickstart procedure is provided as an overview and as a quick reference for those who have already performed SCT upgrades on the switch. For detailed instructions, see the "Upgrading SCT Files" section, which appears later in this appendix.

	Command	Purpose
Step 1	**ftp**	Copy the new SCT files you want to use to the appropriate C:SCT\<card_type> directory. For example, copy new AXSM or FRSM-12 SCT files to the C:SCT\AXSM or C:SCT\FRSM directory. See the "Copying Software Files to the Switch" section, which appears later in this appendix.
Step 2	*username* *password*	Establish a CLI session with the *active* PXM45 card using a user name at any access level.
Step 3	**addsct** <*oprtions*>	Select the slot in which the RPM-PR card is installed.
Step 4	**switchcc** or **reboot**	If you are upgrading the SCTs on redundant cards, switch the roles of the active and standby cards. You need to upgrade the SCTs on the non-upgraded card while it is in standby mode. If you are upgrading the SCTs on non-redundant cards, reboot the card to activate the new SCTs.
Step 5	**dspscts**	Verify router reboot is complete.

Quickstart Procedures for Software Downgrades

Cisco Systems, Inc., recommends that you avoid software downgrades, which replace a current software release with another that has a lower version number. However, there are some situations in which you might want to downgrade the software. For example, if you have been testing pre-release software in a lab, the software version number can be higher than a later official software release. Any time the software version number to which you are changing is lower than the current software version, the change is a downgrade, regardless of when the software versions are released.

The following sections provide quickstart procedures for the following downgrades:

- PXM45 and AXSM Boot Downgrades
- Non-Graceful PXM45 Runtime Software Downgrades
- Non-Graceful AXSM Runtime Software Downgrades

PXM45 and AXSM Boot Downgrades

When redundant cards are used and the downgrade software is compatible with the existing runtime software, boot software downgrades can be graceful. To perform a graceful downgrade of boot software, follow the instructions for the appropriate graceful software upgrade:

- Graceful PXM45 Boot Upgrades
- Graceful AXSM or FRSM-12 Boot Upgrades

Caution Cisco Systems, Inc., does not guarantee that any software downgrade is graceful, so assume that the downgrade is non-graceful and time the downgrade accordingly. The advantage to following the graceful upgrade procedures listed above is that you might be able to delay traffic interruption until the runtime software is downgraded.

When upgrading a standalone card, the downgrade is non-graceful, and you should follow one of the following software upgrade procedures:

- Non-Graceful PXM45 Boot Upgrades
- Non-Graceful AXSM Boot Upgrades

Non-Graceful PXM45 Runtime Software Downgrades

To downgrade PXM45 runtime software, you must clear the entire switch configuration.All traffic is disrupted until the switch downgrade is complete and the configuration has been re-entered. The following quickstart procedure is provided as an overview for PXM45 runtime software downgrades.

Note The switch does not support a configuration restore to a downgraded software version. When you downgrade the PXM45 runtime software, you must re-enter the configuration.

	Command	Purpose
Step 1	*username* *password*	Establish a CLI session with the active PXM45 card using a user name with SERVICE_GP privileges.
Step 2	**saveallcnf** **y**	Save the current switch configuration. See "Saving a Configuration" in Chapter 7, "Switch Operating Procedures." This step gives you the option to upgrade to the software version from which you are downgrading and use the former configuration.
Step 3	**ftp**	Copy the boot and runtime files you want to use to the switch. Also copy the saved configuration file from the C:CNF directory to a remote workstation so you have a backup file if something happens to the hard disk. See "Copying Software Files to the Switch," which appears later in this appendix.

	Command	Purpose
Step 4	**clrallcnf** **y**	Clear the current configuration. See “Clearing a Configuration” in Chapter 7, “Switch Operating Procedures.”
Step 5	**sysVersionSet** “*version*” **reboot**	Select the runtime firmware version the switch will use on the PXM45 card and restart the switch with that firmware. For example: `sysVersionSet "002.001.000.000"` Note that these commands must be entered at the PXM45 backup boot prompt: pxm45bkup>. Refer to “Initializing the Switch” in Chapter 2, “Configuring General Switch Features.”.
Step 6		Reconfigure the PXM45 cards as described in “Configuration Quickstart” in Chapter 2, “Configuring General Switch Features.”

Non-Graceful AXSM Runtime Software Downgrades

AXSM runtime software downgrades are always non-graceful when the PXM45 runtime software is also downgraded (because the PXM45 downgrade requires a clearing of the configuration). The quickstart procedure is provided as an overview of how to downgrade the AXSM software after the PXM45 runtime software has been downgraded.

	Command	Purpose
Step 1	**ftp**	Copy the boot and runtime files you want to use to the switch. See “Copying Software Files to the Switch,” which appears later in this appendix.
Step 2		Refer to “Configuration Quickstart” Chapter 3, “Preparing AXSM Cards and Lines for Communication.” The **setrev** command in the quickstart procedure clears the card configuration and assigns the downgrade software version to the card.

Browsing the File System

The PXM45 hard disk stores log files, configuration files, and boot and runtime software. The switch operating system supports a set of UNIX-like commands that you can use to locate log files or manage software updates. Table A-1 lists commands that you can use to browse the file system.

Note File and directory names in the switch file system are case sensitive. Also, some of the commands listed in Table A-1 are not available at all administrator access levels.

Table A-1 File System Commands at Switch Prompt

Command	Description
cd	Change directories. Access level required: ANYUSER or above.
copy	Copies a file from one location to another. Syntax: **copy** <*source file name*> <*destination file name*> Access level required: GROUP1 or above.
del	Deletes a file. Syntax: **del** <*file name*> Access level required: GROUP1 or above.
ll	List directory contents using long format, which includes the name, size, modification date, and modification time for each file. This command also displays the total disk space and free disk space. Syntax: **ll** Access level required: ANYUSER or above.
ls	List directory contents using the short format, which displays filenames, total disk space, and free disk space. Syntax: **ls** Access level required: ANYUSER or above.
pwd	Display the present working directory. Syntax: **pwd** Access level required: ANYUSER or above.
rename	Renames a file. Syntax: **rename** <*old file name*> <*new file name*> Access level required: GROUP1 or above.
whoami	Lists the login name for the current session. Syntax: **whoami** Access level required: ANYUSER or above.

Locating Software Updates

For information on locating software updates, refer to the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3*.

Copying Software Files to the Switch

This section describes how to copy software files to an MGX 8850 or MGX 8950 switch. The switch cards use boot software and runtime software. Each PXM45, AXSM, and FRSM-12 card uses the boot software to define communications between the card components and to enable cards to start up. The runtime software defines how the card operates after startup. RPM-PR cards function on the runtime software and use the boot software only when they cannot load the runtime software.

Note The boot and runtime software are installed on the switch at the factory. Before you copy new files to the switch, verify that you need to update them by comparing the file versions on the disk to those recommended in the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3*.

MGX 8850 and MGX 8950 switches provide a File Transfer Protocol (FTP) service to support file transfers to the switch. If you have FTP client software and network connectivity to both the switch and the server where the software files are stored, you can use FTP to transfer files directly from the server to the switch.

Note The following procedure describes how to copy files to the switch when the runtime software is up and running (showing the node name switch prompt). When the runtime software cannot load, copy the software files to the switch as described in the "Transferring Software Files to and from the Switch" section in Appendix B, "PXM45 Backup Boot Procedures."

Step 1 Refer to the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3* to locate a server from which you can download the files.

Step 2 Using a workstation with FTP client software, transfer PXM45, AXSM, and FRSM-12 files from the server to the switch directory C:/FW.

The procedure you use for transferring the files depends on the FTP client software you are using. When initiating the FTP connection, remember the following:

- Select the switch by entering its IP address.
- When prompted for a username and password, enter the username and password you use when managing the switch.
- When configuring file transfer options, select binary mode for the file transfer.

Step 3 To verify that the new PXM45, AXSM, and FRSM-12 files have been transferred to the switch, log into the switch and display the contents of the C:/FW directory.

Step 4 Using a workstation with FTP client software, transfer RPM-PR files from the server to the switch directory E:/RPM.

Note You must use a capital E when referencing the E drive in switch commands.

Step 5 To verify that the new RPM-PR files have been transferred to the switch, log into the switch and display the contents of the E:/RPM directory.

For more information on browsing the switch file system, see the "Installing SCT Files" section, which appears earlier in this appendix.

Upgrade Procedures for PXM45, AXSM, and FRSM-12 Cards

The following sections describe procedures that support upgrades to PXM45, AXSM, and FRSM-12 cards. For complete upgrade procedures, see the "Quickstart Procedures for Software Upgrades" section, which appears earlier in this appendix. The procedures in this section detail some of the tasks listed in the quickstart procedures.

Upgrading PXM45 Boot Software

This section describes how to upgrade the PXM45 boot software on a single PXM45 card. If you are performing a graceful upgrade, use the quickstart procedure described in "Graceful PXM45 Boot Upgrades," which appears earlier in this appendix. The following procedure provides detailed information on the upgrade task within the quickstart procedure.

Step 1 If you have not done so already, establish a CLI session with the PXM45 card using the CP port on the UI-S3 back card and a user name with CISCO_GP privileges.

Step 2 If you have not done so already, change to PXM45 Backup Boot mode as described in the "Changing to PXM45 Backup Boot Mode" section in Appendix B, "PXM45 Backup Boot Procedures.".

Step 3 To burn the boot software on the PXM45, enter the **sysFlashBootBurn** command as follows:

```
pxm45bkup> sysFlashBootBurn "filename"
```

Replace *filename* with the complete path to the boot file on the PXM45 hard drive. For example:

```
pxm45bkup> sysFlashBootBurn "C:FW/pxm45_003.000.000.000_bt.fw"
```

Step 4 When the switch prompts you to confirm this action, type **y** and press **Return**.

When the boot code burning process is complete, the switch displays a message similar to the following example:

```
Flash download completed ...
value = 0 = 0x0
```

Step 5 When the boot code has been burned, reset the card with the **reboot** command. For example:

```
pxm45bkup> reboot
```

Be patient and wait for the Login prompt to appear.

Step 6 When the Login prompt appears, log in to the switch as you do at the beginning of a CLI session. The switch prompt should appear.

Step 7 To confirm that the PXM45 card is now using the correct boot code, enter the **dspcd** command.

The Boot FW Rev row in the display should show the new revision as shown in the following example:

```
8850_NY.7.PXM.a > dspcd
8850_NY                          System Rev: 02.01   Mar. 04, 2001 22:47:23 PST
MGX8850                                              Node Alarm: NONE
Slot Number    7    Redundant Slot:  8

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      PXM45               UI Stratum3         PXM HardDiskDrive
Reserved Card:      PXM45               UI Stratum3         PXM HardDiskDrive
State:              Active              Active              Active
Serial Number:      SBK050302AF         SBK045203PJ         SBK044602HJ
Prim SW Rev:        2.1(0)             ---                 ---
Sec SW Rev:         2.1(0)             ---                 ---
Cur SW Rev:         2.1(0)             ---                 ---
Boot FW Rev:        3.0(0.0)              ---                 ---
800-level Rev:      A0                  A0                  A0
800-level Part#:    800-06147-08        800-05787-02        800-05052-04
CLEI Code:          BAA670YCAA          BA7IBCLAAA          BA7IADNAAA
Reset Reason:       On Power up
Card Alarm:         NONE
Failed Reason:      None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:
```

After you confirm the upgrade to the first PXM45 card, the boot software upgrade for that card is complete.

Loading the Runtime Upgrade Software

This section describes how to load the runtime upgrade software in preparation for running it. Production switches should have redundant cards installed, so that upgrades can occur without interrupting traffic. For graceful upgrades, the upgrade software is loaded on the standby card first, and then the control is switched to upgraded card so that the other card can be upgraded. The best way to assess the upgrade status of a card is to enter the **dspcd** <*slot*> command. For example:

```
8850_NY.7.PXM.a > dspcd
8850_NY                          System Rev: 02.01   Mar. 04, 2001 22:47:23 PST
MGX8850                                              Node Alarm: NONE
Slot Number    7    Redundant Slot:  8

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      PXM45               UI Stratum3         PXM HardDiskDrive
Reserved Card:      PXM45               UI Stratum3         PXM HardDiskDrive
State:              Active              Active              Active
Serial Number:      SBK050302AF         SBK045203PJ         SBK044602HJ
Prim SW Rev:        2.1(0)             ---                 ---
Sec SW Rev:         2.1(0)             ---                 ---
Cur SW Rev:         2.1(0)             ---                 ---
Boot FW Rev:        3.0(0.0)              ---                 ---
800-level Rev:      A0                  A0                  A0
800-level Part#:    800-06147-08        800-05787-02        800-05052-04
CLEI Code:          BAA670YCAA          BA7IBCLAAA          BA7IADNAAA
Reset Reason:       On Power up
Card Alarm:         NONE
Failed Reason:      None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:
```

The primary (Prim SW Rev), secondary (Sec SW Rev), and current (Cur SW Rev) software revision labels indicate the status of an upgrade. In this example, these numbers match because the runtime software upgrade has not started. (Note that the boot software has been upgraded as indicated by the Boot FW Rev label.)

The primary software revision indicates which revision a card will run if it becomes active, and the secondary revision indicates an alternate revision that the card will use if the abortrev command is entered. (For more information on aborting an upgrade, see the "Aborting a Runtime Software Upgrade"section, which appears later in this appendix.) The current software revision represents the software the active card is using.

The normal sequence of commands for a runtime software upgrade is **loadrev**, **runrev**, and **commitrev**. Table A-2 shows how the software revision levels change during a graceful runtime software upgrade

Table A-2 Software Versions Reported During Graceful Upgrades

Software Revision	Before Upgrade		After loadrev		After runrev		After commitrev	
	Slot 7	Slot 8	Slot 7	Slot 8	Slot 7	Slot 8	Slot 7	Slot 8
	Active	Standby	Active	Standby	Standby	Active	Active	Standby
Primary	2.1(0)	2.1(0))	2.1(0)	2.1(0)	3.0(0.0)	3.0(0.0)	3.0(0.0)	3.0(0.0)
Secondary	2.1(0)	2.1(0)	3.0(0.0)	3.0(0.0)	2.1(0)	2.1(0)	3.0(0.0)	3.0(0.0)
Current	2.1(0)	2.1(0)	2.1(0)	3.0(0.0)	3.0(0.0)	3.0(0.0)	3.0(0.0)	3.0(0.0)

For non-graceful upgrades, the load process defines the software version to which the switch is about to be upgraded. Table A-3 shows how the revision levels change during a non-graceful upgrade.

Table A-3 Software Versions Reported During Non-Graceful Upgrades

Software Revision	Before Upgrade	After loadrev	After runrev	After commitrev
Primary	2.1(0)	2.1(0)	3.0(0.0)	3.0(0.0)
Secondary	2.1(0)	3.0(0.0)	2.1(0)	3.0(0.0)
Current	2.1(0)	2.1(0)	3.0(0.0)	3.0(0.0)

If you are performing a graceful upgrade, use the quickstart procedure described in the “Graceful PXM45, AXSM, and FRSM-12 Runtime Software Upgrades” section, which appears earlier in this appendix. The following procedure provides detailed information on the load task within the quickstart procedure.

Step 1 To load the upgrade runtime software version on a PXM45, AXSM, or FRSM-12 card, enter the **loadrev** command as follows:

```
mgx8850a.7.PXM.a > loadrev <slot> <revision>
```

Replace <*slot*> with the card slot number for the card to be upgraded, and replace <*revision*> with the software version number for the update. For graceful upgrades, you can specify either the active or the standby card. The switch software will automatically load the upgrade software on the standby card when it is installed. The following example shows how to enter this command:

```
mgx8850a.7.PXM.a > loadrev 7 2.1(0)
```

After you enter the **loadrev** command, the standby card comes up in the standby-U state.

You can find the software version number in the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3*. You can also determine the version number from the runtime software filename as described in the “*Determining the Software Version Number from Filenames*” section, which appears in Chapter 7, “Switch Operating Procedures.”

Step 2 When prompted to confirm the command, type **y** and press **Return** to continue.

Step 3 To verify that the load command was processed correctly, enter the **dspcd** <*slot*> command and check the status of the software revision levels. You can also view the revision levels with the **dsprevs** command.

> **Note** In a standalone configuration, the switch does not start the upgraded software until the **runrev** command is entered. In a redundant configuration, the switch starts the upgraded software on the standby card. The standby card does not become active until the **runrev** command is entered.

Starting the Upgrade Software

After you load the runtime upgrade software for a PXM45, AXSM, or FRSM-12 card, enter the **runrev** command to start using the software. The version levels for graceful and non-graceful upgrades change as shown earlier in Table A-2 and Table A-3. The following procedure describes how to start the upgrade software.

Step 1 To start using the new runtime software version on a PXM45, AXSM, or FRSM-12 card, enter the following command:

```
mgx8850a.7.PXM.a > runrev <slot> <revision>
```

Replace <*slot*> with the card slot number, and replace <*revision*> with the same software version number you specified with the **loadrev** command. For graceful upgrades, you can specify either the active or the standby card. The switch software will automatically run the upgrade software on the standby card when it is installed. The following example shows how to enter this command:

```
mgx8850a.7.PXM.a > runrev 7 2.1(0)
```

The active card is reset, and the former standby card comes up in the active-U state.

Step 2 When prompted to confirm the command, type **y** and press **Return** to continue.

Step 3 To verify that the load command was processed correctly, enter the **dspcd** <*slot*> command and check the status of the software revision levels. You can also view the revision levels with the **dsprevs** command.

Step 4 When the former active PXM45 come sup in the standby-U state, enter the **commitrev** command to commit to that software version. This step is optional.

After the **runrev** command is entered, the switch starts running the new software revision. The secondary software revision shows that a previous revision is still available. Whenever the secondary software revision is different from the primary and current software revisions, you can revert back to the secondary software revision as described in the "Aborting a Runtime Software Upgrade" section, which appears later in this appendix.

Upgrading Boot Software on an AXSM or FRSM-12 Card

The upgrade procedure for the boot software on a single AXSM or FRSM-12 card is the same for graceful and non-graceful upgrades. The difference between the graceful and non-graceful upgrades is the sequence of commands before and after the upgrade on a single card. For information on the proper sequence see the "Graceful AXSM or FRSM-12 Boot Upgrades" section or the "Non-Graceful AXSM Boot Upgrades" section, both of which appear earlier in this appendix.

To upgrade the boot software, use the following procedure.

Step 1 Copy the new boot software files for the AXSM or FRSM-12 card to the switch as described in the "Copying Software Files to the Switch" section, which appears earlier in this appendix.

Step 2 Establish a CLI session with the switch using a user name with SERVICE_GP privileges or higher.

Step 3 To burn the new AXSM or FRSM-12 boot code, enter the burnboot command as follows:

```
pop20one.7.PXM.a > burnboot <slot> <revision>
```

Replace <*slot*> with the slot number of a standalone AXSM/FRSM-12 card, or an AXSM/FRSM-12 card operating in standby mode. Replace <*revision*> with the software revision number to which you are upgrading. For example:

```
pop20one.7.PXM.a > burnboot 1 2.1(0)
```

Step 4 When prompted to confirm the upgrade, type **y** and press **Return**.

After you confirm the upgrade, the new boot code is burned into the AXSM or FRSM-12 card and the card is reset. Be patient, the card reset takes some time. You can enter the **dspcds** command to display the status of the AXSM or FRSM-12 card. At first, the status may show that the card slot is empty or the card is rebooting. Reenter the command periodically to see the current status of the card. When the card status returns to active or standby, you are ready to continue.

Step 5 To confirm that the AXSM or FRSM-12 card is now using the correct boot code, enter the **dspcd** <*slot*> command. The Boot FW Rev row in the display should show the new revision as shown in the following example:

```
8850_NY.7.PXM.a > dspcd 1
8850_NY                          System Rev: 02.01   Mar. 04, 2001 22:58:22 PST
MGX8850                                              Node Alarm: NONE
Slot Number:   1    Redundant Slot: NONE

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      AXSM_4OC12          SMFIR_2_OC12        SMFIR_2_OC12
Reserved Card:      AXSM_4OC12          SMFIR_2_OC12        UnReserved
State:              Active              Active              Active
Serial Number:      SAK0344001V         SBK0406002K         SAK032800Q6
Prim SW Rev:        2.1(0)              ---                 ---
Sec SW Rev:         2.1(0)              ---                 ---
Cur SW Rev:         2.1(0)              ---                 ---
Boot FW Rev:        3.0(0.0)              ---                 ---
800-level Rev:
800-level Part#:    800-05774-05        800-05383-01        800-05383-01
CLEI Code:          1234567890          BAI9ADTAAA          0
Reset Reason:       On Power up
Card Alarm:         NONE
Failed Reason:      None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:
```

After you confirm the upgrade to the AXSM or FRSM-12 card, the boot software upgrade for that card is complete.

Aborting a Runtime Software Upgrade

After upgrading PXM45, AXSM, or FRSM-12 runtime software, you can revert to the previously used version of software at any time, as long as you have not committed to the new software version with the **commitrev** command (which is described in the next section).

Caution Reverting to the previously used version of runtime software resets both PXM45 cards and terminates all calls in progress.

To revert to the previously used runtime software version, use the following procedure.

Step 1 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 2 To display the software revisions known to the switch, enter the **dspcd** <*slot*> command. (You can also view the revision levels with the **dsprevs** command.)

Replace *slot* with the slot number of the active PXM45, AXSM, or FRSM-12 card. To complete the next step, you need to know the secondary software revision shown in the display.

Note If the primary and secondary software revisions are the same, there is no other revision level to revert back to.

Step 3 To abort use of the primary software revision and revert back to the secondary software revision, enter the following command:

```
mgx8850a.7.PXM.a > abortrev <slot> <revision>
```

Replace <*slot*> with the card slot number for the active PXM45, AXSM, or FRSM-12 card, and replace <*revision*> with the software version number for the secondary software revision.

Step 4 To verify that the standby card is running the previously used software version, enter the **dspcd** <*slot*> command to view the software version in use. You can also view the revision levels with the **dsprevs** command.

Committing to a Runtime Software Upgrade

Committing to an upgrade does the following:

- Disables use of the **abortrev** command to revert back to the previously used version of software
- Enables upgrading of the current version of software

Once you are sure that an upgrade is stable, you can use the **commitrev** command commit to that software version. This prevents other administrators from inadvertently reverting to the previous version. You must also commit to the current software version before you can upgrade to another software version.

To commit to the currently running runtime software version, use the following procedure.

Step 1 Establish a configuration session using a user name with SERVICE_GP privileges or higher.

Step 2 Determine if there is an unfinished upgrade by entering one of the following commands:

a. If necessary, use the **cc** command to select the active PXM45 card.

b. Enter the **dspcd** <*slot*> command.

c. Check the **dspcd** command report to see if the same software revision is listed for the Primary Software Revision (Prim SW Rev), Secondary Software Revision (Sec SW Rev), and Current Software Revision (Curr SW Rev).

If all version numbers are identical, the runtime software can be upgraded. There is no need to commit to the current software revision.

Step 3 To commit to the software version, enter the following command:

```
mgx8850a.7.PXM.a > commitrev <slot> <revision>
```

Replace <*slot*> with the card slot number for the active PXM45, AXSM, or FRSM-12 card, and replace <*revision*> with the software version number for the currently used software version. To display the software version number, use the **dspcd** <*slot*> command to view the software version in use. You can also view the revision levels with the **dsprevs** command.

Note Cisco Systems recommends that you avoid configuration changes until after you have run the **commitrev** or **abortrev** commands.

Upgrade Procedures for RPM-PR Cards

The following sections describe how to upgrade boot and runtime software on RPM-PR cards.

Upgrading RPM-PR Boot Software

At the factory, a boot file is installed in the bootflash on the RPM-PR card and is used to boot the card. The runtime software is updated more frequently than the boot software. However, the boot software is updated occasionally. When you are updating runtime software, check the release notes that accompany the runtime software to see if a boot software upgrade is required.

The boot software is stored in bootflash memory on the RPM-PR card. To manage the software in bootflash, you access it as if it were a hard disk. For example, in copy and delete file commands, files are identified as bootflash:*filename* (which is similar to e:*filename*).

The following example shows a directory of bootflash contents:

```
Router(boot)#show flash:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .D config   D4F7352A   40330   18      686 Jan 30 2001 18:18:41 auto_config_slot09
2   .D config   CBF007C1   40660    9      688 Feb 22 2001 15:33:11 slot9.cnf
3   .. image    F596869A  2973E8   27  2452744 Feb 28 2001 03:16:05
rpm-boot-mz_002.001.000.000
```

Note Although you can display directory contents with the **dir bootflash:** command, the **show flash:** command provides more detail. Although bootflash and flash are separate entities on other Cisco Routers, both terms refer to the same entity on the RPM.

In the example above, the numbers in the left column indicate the order in which the RPM-PR will try to load software. The second column shows that the first two files are marked for deletion (D). The last column lists the names of the files stored in bootflash.

When managing the bootflash, consider the following facts:

- If the BOOTLDR variable is set and the RPM-PR card is reset, the RPM-PR card attempts to load the boot software specified.
- If the BOOTLDR variable is *not* set and the RPM-PR card is reset, the RPM-PR card tries to load the first bootable image in bootflash. The first bootable image is the image that appears first in the **show flash:** command display, and this is usually the oldest file in bootflash. Therefore, if you do not use the BOOTLDR variable, the bootflash contents must be reorganized each time you upgrade boot software.
- The RPM-PR card will not attempt to boot from automatic configuration files, which are named using the format *auto_config_slotnn,* where nn represents a slot in which an RPM-PR card is installed.
- If the image that RPM-PR tries to load does not load, you can reset the RPM-PR from the active PXM45 card using the **resetcd** <*slot*> command.
- Files are not removed from bootflash until the **squeeze flash:** command is entered. If you delete a file and do not enter **squeeze flash:**, the RPM-PR card will still attempt to boot from the first image it finds, whether it is marked for deletion or not.

Caution If all bootable images are deleted from bootflash, the card must be returned to the factory to be reprogrammed.

If you do need to upgrade the boot software, you can copy the new boot file to the PXM45 disk, and then copy it to the bootflash. The following procedure describes how to upgrade the boot software.

Step 1 Copy the new boot software file for the RPM-PR card to the switch (E:RPM) as described in the "Copying Software Files to the Switch" section earlier in this appendix.

Step 2 Establish a configuration session using any valid user name.

Step 3 Enter the **cc** command to select the RPM-PR card to update.

```
pop20two.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the Cisco IOS prompt for the router on the RPM-PR card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS commands (which is a topic that is beyond the scope of this book). This procedure details only those commands that are unique to setting up RPM-PR on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 4 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 5 To verify router access to the PXM45 hard disk and display the boot file name, enter **dir e:** command.

```
Router#dir e:
Directory of c:/

65539  -rw-         815   Sep 13 2001 23:51:10  auto_config_slot09
65540  -rw-     2588780   May 22 2001 19:06:54  rpm-boot-mz_002.001.000.000
84611  -rw-     2452768   Apr 05 2001 05:34:44  rpm-boot-mz.122-4.T
66805  -rw-     8529104   May 22 2001 19:09:00  rpm-js-mz_002.001.000.000
85809  -rw-     7936012   Apr 05 2001 06:28:54  rpm-js-mz.122-4.T

104857600 bytes total (83068928 bytes free)
```

Step 6 To display the files in the bootflash, enter the **show flash:** command.

```
Router#show flash:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. image    F596869A  296D88   27  2452744 Feb 28 2001 03:16:05 rpm-boot-mz_122-4.T

30315128 bytes available (2452872 bytes used)
```

Step 7 To copy new boot software to the bootflash, enter the **copy** command.

```
Router#copy c:rpm-boot-mz_002.001.000.000 bootflash:
Destination filename [rpm-boot-mz_002.001.000.000]?
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
2334044 bytes copied in 35.768 secs (66686 bytes/sec)
```

Tip When prompted for the destination filename, press **enter** to use the source filename shown in the prompt. To change the destination filename, type a new filename after the prompt.

Step 8 To verify that the file was copied, enter the **show flash:** command.

Step 9 To set the BOOTLDR variable to specify the new boot software, complete the following steps:

a. Enter the router global configuration mode

```
Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
```

b. Set the BOOTLDR variable to the new boot image to be loaded

```
Router(config)#boot bootldr bootflash:rpm-boot-mz_002.001.000.000
```

c. Exit global configuration mode and save the new configuration.

```
Router(config)#^Z
Router#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

d. Verify that the BOOTLDR variable is set

```
RPM-XF#show bootvar
BOOT variable = bootflash:rpmxf-......
CONFIG_FILE variable =
BOOTLDR variable = bootflash:rpm-boot-mz_002.001.000.000
Configuration register is 0x2
```

Step 10 To reorganize the bootflash so that the new boot software is loaded first when the BOOTLDR variable is not set, complete the following steps:

a. Because all files that precede the new boot image in bootflash have to be deleted, copy bootflash files you want to save to the PXM45 hard disk using the following command.

```
Router#copy  bootflash:filename c:filename
```

b. Mark all the files that precede the new boot image in bootflash using the **del bootflash:** command as shown in the following example:

```
Router#del bootflash:
Delete filename []? rpm-js-mz
Delete bootflash:rpm-js-mz? [confirm]
Router#
```

Tip To unmark a bootflash file so that it won't be deleted when the **squeeze flash:** command is run, enter the **undelete** <*number*> command, where *number* is the file number displayed in the left-most column of the **show flash:** command display.

c. To delete all files that are marked for deletion from bootflash, enter the **squeeze flash:** command as shown in the following example:

```
Router(boot)#squeeze flash:
All deleted files will be removed. Continue? [confirm]y
Squeeze operation may take a while. Continue? [confirm]

Squeeze of bootflash complete
```

d. Copy any previously saved bootflash files you want to use from the PXM45 hard disk using the following command.

```
Router#copy c:filename bootflash:filename
```

You might want to copy previously saved configuration files back to bootflash, or you might want to copy an older boot image to be used if the newer version becomes corrupt.

e. Enter the **show flash:** command to verify that the bootflash files are as you want them. The preferred boot software should appear first in the list.

Caution If all bootable images are deleted from bootflash and the RPM-PR card is restarted, the card must be returned to the factory to be reprogrammed. When you are done managing the bootflash, the **show flash:** command should display at least one bootable image, and the image you want the card to boot from should be the first bootable image in the list.

Tip If the **show flash:** command does not display a bootable image, copy a bootable image to bootflash as described earlier in this procedure. You can continue to manage the bootflash, even when there are no files in bootflash, until the router is restarted.

Step 11 When you are sure the bootflash is ready for use, you can enter the **reload** command to restart the RPM-PR card, or you can upgrade the runtime software as described in the next section.

Tip If the bootflash contains bootable images and the sequence is such that the card will not start, you can enter rommon mode and load the bootable image. To get into rommon mode, establish a console connection to the RPM-PR card, reset the RPM-PR card using the **resetcd** <*slot*> command from the active PXM1E card, then quickly enter the **CTRL-[**, **Break** sequence at the RPM-PR console. The command to send a **Break** depends on the computer platform and software you are using. It may take a couple of attempts to successfully get into rommon mode. When you are in rommon mode, the RPM-PR card displays the *rommon 1* > prompt.

Once in rommon mode, you can enter the **dir bootflash:** command to display the images in bootflash. To boot one of the images, enter a **boot** command using the following format: **boot bootflash:***filename*.

Upgrading RPM-PR Runtime Software

The runtime software on the RPM-PR can be loaded from the following sources:

- E:RPM directory on the PXM45 hard disk
- Bootflash
- TFTP server on a LAN to which an RPM back card is connected

Cisco Systems recommends that you configure the RPM-PR card to load from the E:RPM directory on the PXM45 hard disk. Note that images will load much faster from bootflash, but if you are using multiple RPM-PR cards, it takes longer to complete an upgrade because the runtime software must be copied to each RPM-PR card's bootflash instead of to a single location.

At startup, the RPM-PR card attempts to load the software in the order listed in the startup-config file. The following example shows an excerpt from a startup-config file:

```
!
boot system e:rpm-js-mz_122-4.T
boot system bootflash:rpm-js-mz_122-4.T
boot config c:auto_config_slot09
logging rate-limit console 10 except errors
enable password *****
!
```

In the startup-config file example, the RPM-PR card attempts to load the runtime software from the PXM45 card (e:rpm-js-mz_122-4.T) first, and if that fails, it attempts to load the image copy stored in bootflash. This configuration takes longer to upgrade, but it assures the card can reboot if someone accidentally removes the file on the PXM45 hard disk.

To configure the RPM-PR to load upgraded runtime software from the PXM45 hard disk, you need to do the following tasks:

- Copy the upgraded file to the PXM45 hard disk.
- Update the boot system variable in the router startup-config file to load the new file.
- Reset the RPM-PR card so that it loads the new file.

RPM-PR cards can be configured for 1:N redundancy as well as for non-redundant configurations. The procedures for both types of configuration are in the sections that follow.

Tip To simplify runtime software updates, copy the runtime file in the E:RPM directory and rename it to a generic name such as rpm-js-mz. The production runtime filenames have version numbers appended to them, but you can change this. This approach allows you to perform future upgrades by copying the file to the hard disk, renaming a copy of the file to your generic name, and resetting each card. The approach eliminates the need to reconfigure IOS on each card to recognize the new filename.

Upgrading RPM-PR Runtime Software for 1:N Redundancy

Redundancy must be established before you use the procedure in this section. If redundancy has not been established, upgrade each RPM-PR card using the "Upgrading RPM-PR Runtime Software for Non-Redundant Cards" procedure in the next section.

To upgrade the RPM-PR runtime software for 1:N redundancy, use the following procedure.

Step 1 Copy the new runtime software file for the RPM-PR card to the switch (E:RPM) as described in the "Copying Software Files to the Switch" section, which appears earlier in this appendix.

Step 2 If you are using a generic filename for your runtime images, copy the file on the PXM45 hard disk and rename the copy. For example:

```
8850_LA.8.PXM.a > copy rpm-js-mz_122-4.T rpm-js-mz
```

Step 3 Establish a configuration session using any valid user name.

Step 4 If your RPM-PR is already configured to use a file with a generic name, skip to Step 13.

Step 5 Enter the **cc** command to select the RPM-PR card to update.

```
pop20two.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM-PR card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this book. This procedure details only those commands that are unique to setting up RPM-PR on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 6 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 7 Display the startup runtime software filename by entering the **show bootvar** command.

```
Router#show bootvar
BOOT variable = c:rpm-js-mz_122-4.T,12;
CONFIG_FILE variable = c:auto_config_slot09
BOOTLDR variable does not exist
Configuration register is 0x2
```

In the example above, the startup runtime software file is c:rpm-js-mz_122-4.T, and it has a version number attached to it. Another way to view the boot list is to enter the **show startup-config** command and look for the **boot system** commands.

Step 8 Enter the router global configuration mode.

```
Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
```

Step 9 If you need to change the boot system filenames, remove the existing boot list using the **boot system** command as follows:

```
Router(config)# no boot system
```

Step 10 Create a new boot list by entering one or more **boot system** commands as follows:

```
Router(config)# boot system e:filename
```

Replace the filename variable with the name of the new runtime file that was previously transferred to the E:RPM directory on the switch. For example:

```
Router(config)# boot system e:rpm-js-mz
```

If you want to enter additional boot system commands, enter them in the order in which you want the RPM-PR card to use them. The following example adds a statement to load from bootflash if the runtime file is not found on the PXM45 hard disk:

```
Router(config)# boot system bootflash:rpm-js-mz_122-4.T
```

Note Before the RPM-PR card can load runtime software from bootflash, you must copy the runtime software to the bootflash. The procedure for copying files from the PXM45 hard disk to bootflash is described in the previous section.

Step 11 Exit global configuration mode and save the new configuration.

```
Router(config)#^Z
Router#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

Step 12 To verify the change, enter the **show bootvar** or **show run** commands.

Step 13 Switch to the active PXM45 card and reset the RPM-PR card. For example:

```
Router#cc 8

(session redirected)

8850_LA.8.PXM.a > resetcd 9
The card in slot number 9, will be reset. Please confirm action
resetcd: Do you want to proceed (Yes/No)? y
```

Step 14 Switch to the secondary card using the **softswitch** command as follows:

```
8850_LA.8.PXM.a > softswitch <fromSlot> <toSlot>
```

Replace <*fromSlot*> with the slot number of the primary card. Replace <*toSlot*> with the slot number of the secondary card.

This step makes the secondary card active and resets the primary RPM-PR card. When the Primary card resets, it loads the upgraded software.

Step 15 Switch back to the primary card using the **softswitch** command as follows:

```
8850_LA.8.PXM.a > softswitch <fromSlot> <toSlot>
```

Replace <*fromSlot*> with the slot number of the secondary card. Replace <*toSlot*> with the slot number of the primary card.
This step makes the primary card active and resets the secondary RPM-PR card. When the reset is complete, the secondary card is ready to run the upgraded software.

Step 16 To verify that the router reboot is complete, enter the **dspcds** or **dspcd** <*slot*> commands. The reboot is complete when the card state displays as *Active*. Another way to verify router operation is to use the **cc** slot command. If you can access the router from the switch prompt, the router reboot is complete.

Step 17 If there are other primary cards with redundant (secondary) cards, repeat this procedure for each primary card.

Upgrading RPM-PR Runtime Software for Non-Redundant Cards

To upgrade the RPM-PR runtime software for non- redundant cards, use the following procedure.

Step 1 Copy the new runtime software file for the RPM-PR card to the switch (E:RPM) as described in the "Copying Software Files to the Switch" section, which appears earlier in this appendix.

Step 2 If you are using a generic filename for your runtime images, copy the file on the PXM45 hard disk and rename the copy. For example:

```
8850_LA.8.PXM.a > copy rpm-js-mz_122-4.T rpm-js-mz
```

Step 3 Establish a configuration session using any valid user name.

Step 4 If your RPM-PR is already configured to use a file with a generic name, skip to Step 13.

Step 5 Use the **cc** command to select the RPM-PR card to update.

```
pop20two.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM-PR card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this book. This procedure details only those commands that are unique to setting up RPM-PR on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 6 Configure the RPM-PR card to store its configuration on the PXM45 hard disk by entering the following command:

```
Router> boot config e:auto_config_slot#
```

Step 7 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 8 Display the startup runtime software filename by entering the **show bootvar** command.

```
Router#show bootvar
BOOT variable = c:rpm-js-mz_122-4.T,12;
CONFIG_FILE variable = c:auto_config_slot09
BOOTLDR variable does not exist
Configuration register is 0x2
```

In the example above, the startup runtime software file is c:rpm-js-mz_122-4.T, and it has a version number attached to it. Another way to view the boot list is to enter the **show startup-config** command and look for the **boot system** commands.

Step 9 Enter the router global configuration mode.

```
Router#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
```

Step 10 If you need to change the boot system filenames, remove the existing boot list using the **boot system** command as follows:

```
Router(config)# no boot system
```

Step 11 Create a new boot list by entering one or more **boot system** commands as follows:

```
Router(config)# boot system e:filename
```

Replace the filename variable with the name of the new runtime file that was previously transferred to the E:RPM directory on the switch. For example:

```
Router(config)# boot system e:rpm-js-mz
```

If you want to enter additional boot system commands, enter them in the order in which you want the RPM-PR card to use them. The following example adds a statement to load from bootflash if the runtime file is not found on the PXM45 hard disk:

```
Router(config)# boot system bootflash:rpm-js-mz_122-4.T
```

Note Before the RPM-PR card can load runtime software from bootflash, you must copy the runtime software to the bootflash. The procedure for copying files from the PXM45 hard disk to bootflash is described in the previous section.

Step 12 Exit global configuration mode and save the new configuration.

```
Router(config)#^Z
Router#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

Step 13 To verify the change, enter the **show bootvar** or **show run** commands.

Step 14 Switch to the active PXM45 card and reset the RPM-PR card. For example:

```
Router#cc 8

(session redirected)

8850_LA.8.PXM.a > resetcd 9
The card in slot number 9, will be reset. Please confirm action
resetcd: Do you want to proceed (Yes/No)? y
```

Upgrading SCT Files

Once you have installed the SCT files on your network, you can use the **cnfsct** command to overwrite them with new files with the same major version. This means that the files have been To replace an SCT file with a new file of the same major version, use the following procedure:

Step 1 FTP the new SCT file to the C:SCT/TEMP folder, as described in "Copying Software Files to the Switch," which appears earlier in this appendix.

Step 2 Establish a configuration session at any user access level.

Step 3 Enter the command **cnfsct** <*options*> command at the active PXM switch prompt:

```
M8850_LA.1.pxm.a > cnfsct <card type> <sct type> <sct id> <major ver> <checksum> <sct description>
```

The required parameters for this command are as follows:

Table A-4 cnfsct Command Parameters

Option	Description
card type	Identifies the type of card the SCT runs on. The possible cards are AXSM, AXSME, FRSM, PXM (for PXM1E only), or HSFR.
sct type	Determines whether the SCT is a port SCT or a card SCT.
sct id	Number between 1 and 65335 which identifies an SCT.
major ver	Major version number of a file. This number changes when a new parameter is added to a MIB. Only Cisco can generate a new major version of a file.
checksum	SCT identification number that comes from Cisco and is published in the release notes. The checksum number can be from 1 to 132 characters, but cannot included space characters.
sct description	Describes the SCT file.

In the following example, the new AXSM card SCT overwrites the old AXSM card SCT.

```
M8850_LA.1.AXSM.a > cnfsct AXSM CARD 00122 00001 0x6fae1018 feb_1stSCT
```

Step 4 Enter the **dspscts** command to ensure that the latest SCT version was registered on your network.

The status of the SCT would be marked as "failed" if the file does not exist or does not match the major and minor versions.

Troubleshooting Upgrade Problems

Table A-5 lists the symptoms for upgrade problems and suggestion on how to correct them.

Tip When troubleshooting problems on standby PXM45 cards or cards that do not start up to the active state, establish communications through the boot IP address or through the console port.

Table A-5 Troubleshooting Upgrade Problems

Primary Symptom	Secondary Symptom	Suggested Action
loadrev or **runrev** command fails	—	The **loadrev** command is blocked when a previous upgrade has not been completed with the **commitrev** command. Enter the **dsprevs** command to locate the cards that are still being upgraded. For more information on a particular card, enter the **dspcd** <*slot*> command and verify that the Current, Primary, and Secondary software revision numbers are identical. If the numbers are not identical, enter the **commitrev** <*slot*> command. Enter the **dspcds** and verify that the standby card is in standby state. Also look for a -U or -D in the **dspcds** command display, which indicates that the card is in the process of being upgraded (-U) or downgraded (-D). The **loadrev** and **runrev** commands are blocked whenever the standby card is not in standby state or an upgrade or downgrade is in progress.
After restart, the switch stops displaying messages and does not display a prompt.	—	Press **Return** to display the prompt.

Table A-5 Troubleshooting Upgrade Problems (continued)

Primary Symptom	Secondary Symptom	Suggested Action
After restart, switch stops at backup boot prompt: pxm45bkup>. (Use a console port connection to see this. If you missed the startup messages, enter the **reboot** command.)	The switch displays the message: *Can not open file C:/version*.	The version file is probably missing. Create the version file as described in the “Initializing the Switch” section in Chapter 2, “Configuring General Switch Features.”
	The switch displays the message: *Unable to determine size of C:/FW/filename.*	The version recorded in the version file doesn’t match software installed in the C:FW directory. Enter the **sysVersionShow** command to see which file the PXM45 is trying to load. Verify that the correct software is installed on the switch using the commands described inthe “Browsing the File System in Backup Boot Mode” section in Appendix B, “PXM45 Backup Boot Procedures.” If the runtime software is not on the hard disk, copy it to the hard disk as described in the “Transferring Software Files to and from the Switch” section in Appendix B, “PXM45 Backup Boot Procedures.” If a typo is entered when initializing the switch, re-enter the **sysVersionSet** command, enter the **sysVersionShow** command to verify the correct setting, and then reboot the switch with the **reboot** command.
	The switch displays the message: *Please run sysDiskCfgCreate.*	The hard disk is formatted, but not ready for operation. Enter the **sysDiskCfgCreate** command. For more information, see the “Initializing the PXM45 Hard Disk” in Appendix B, “PXM45 Backup Boot Procedures.”
Standby PXM45 continually reboots. You can view the rebooting process through the console port.		The active PXM45 card cannot bring up the standby card. The following procedure assumes that this card has just been installed in the switch and that you have given the standby card sufficient time to synchronize with the Active card. Interrupt the boot cycle by pressing **Return**. Timing is important, so you might have to press **Return** multiple times. When the pxm45bkup prompt appears, immediately enter the **sysPxmRemove** command to prevent the Active card from rebooting the standby card while you are working on it. Enter the **sysChangeEnet** command and verify that the *inet on ethernet (e)* and *gateway inet (g)* values are set to the boot and gateway IP address set with the **bootChange** command on the active card. Also, verify that the *boot device* is set to *lnPci*. The **sysChangeEnet** command works like the **bootChange** command, which is described in the “Setting the Boot IP Address” section in Chapter 2, “Configuring General Switch Features.” Enter the **sysClrallcnf** command to clear any configuration data on the standby card set. This command does not clear the boot IP address set with the **sysChangeEnet** command.

Table A-5 Troubleshooting Upgrade Problems (continued)

Primary Symptom	Secondary Symptom	Suggested Action
After restart, the switch stops at backup shell prompt: pxm45>.		If the **Return** key is pressed at one of the auto-boot prompts during start up, the switch stops in shell mode. Enter the **reboot** command to restart the switch and avoid pressing the **Return** key.
The non-active PXM45 will not transition out of the active init state.	One or more non-standby AXSM or FRSM-12 cards are in a transitional state.	A non-standby AXSM or FRSM-12 card is a standalone card, or it is the card within a redundant AXSM/FRSM-12 pair that is trying to go active. When a non-standby AXSM or FRSM-12 card is in a transitional state, such as the init state, the PXM45 cannot transition to the standby state. When all non-standby cards have reached a steady (non-transitional) state, the PXM45 will transition to a steady state. Steady states include the following: active ready, failed, mismatch, empty, empty reserved, and standby ready. **Note** When either card in a redundant AXSM or FRSM-12 pair is active, that pair is not preventing the standby PXM45 from transitioning to a steady state. The standby PXM45 is only affected when both cards in a redundant pair are in a transitional state.

APPENDIX B

PXM45 Backup Boot Procedures

When a PXM45 card starts up, it first loads the boot software on the card. If the PXM45 cannot load the runtime firmware, the card continues to run the boot software in what is called *backup boot* mode. The backup boot prompt is as follows:

```
pxm45bkup>
```

Some switch procedures, such as PXM45 card initialization and boot software upgrades, must be performed in backup boot mode. This appendix describes the following procedures:

- Changing to PXM45 Backup Boot Mode
- Browsing the File System in Backup Boot Mode
- Locating Software Updates
- Transferring Software Files to and from the Switch
- Clearing the Switch Configuration
- Initializing the PXM45 Hard Disk

Changing to PXM45 Backup Boot Mode

You must enter PXM45 backup boot mode to perform certain configuration procedures such as burning boot software. The following procedure describes how to switch to backup boot mode.

Step 1 Establish a CLI session with the PXM45 card using the CP port on the UI-S3 back card and a user name with CISCO_GP privileges.

> **Note** A CP port session is required because you will be resetting the node and entering commands in “Backup Boot mode,” which is not accessible through other connection methods.

Step 2 At the switch prompt, enter the **sh** command to switch to the PXM45 shell mode.

```
mgx8850a.7.PXM.s > sh
```

The switch will display the following shell mode prompt:

```
pxm45>
```

Step 3 At the shell prompt, enter the enter the **sysBackupBoot** command:

```
pxm45> sysBackupBoot
```

Note This command and all commands that you enter in shell mode are case sensitive.

The PXM45 card reboots after you enter this command.

Tip If you are accessing the CP port through a terminal server, rebooting the PXM45 may disrupt your connection. Random characters may appear on the display or the display may appear to "hang." If this happens, use your terminal software command to reset the terminal connection. After a successful reset, switch status messages should start appearing on the display.

When the reboot is complete, the following PXM45 Backup Boot banner appears:

```
PPPPPPPPPPP  XXX      XXX   M         M      4444   555555555
 PP       PP  XX       XX    MM       MM     44 44   55
 PP        pp  XX    XX     MMM     MMM    44  44   55  555
 PP        pp   XX  XX      MMMM   MMMM   44   44   5555   55
 PP       PP     XXXX       MM MMMMM MM  44    44   55      55
 PPPPPPPPP      XX  XX      MM  MMM  MM 44444444444         55
 PP            XX    XX     MM       MM         44   55      55
 PP           XX      XX    MM       MM         44    55    55
PPPP        XXX        XXX MMMM     MMMM      4444     5555
                                                 PXM45 BACKUP BOOT
To avoid reset from the Active card, use sysPxmRemove()
pxm45bkup>Use sysFWLoad() for FW download from active PXM.
```

Step 4 When the PXM45 Backup Boot banner appears, press **return** to display the backup boot prompt:

```
pxm45bkup>
```

When the backup boot prompt appears, you are in backup boot mode.

Caution Some backup boot mode commands, such as debug commands, can consume switch resources and reduce switch performance. Cisco recommends that you only execute backup boot commands described in the product documentation. Experimenting with some commands can degrade switch performance or interrupt switch operation completely.

Step 5 If the PXM45 you restarted is the standby card for an active PXM45 card in the same switch, enter the **sysPxmRemove** command to prevent the active card from restarting the card you are working on.

Tip To display a list of commands available in backup boot mode, enter the **help** command.

Browsing the File System in Backup Boot Mode

The PXM45 hard disk stores log files, configuration files, and boot and runtime software. The switch operating system supports a set of UNIX-like commands that you can use to locate log files or manage software updates. Many of the commands are the same commands that operate at the switch prompt, however, in backup boot mode you must enclose the file path in quotation marks. Table B-1 lists commands that you can use to browse the file system.

Note File and directory names in the switch file system are case sensitive.

Table B-1 File System Commands at Backup Boot Prompt

Command	Description
cd	Change directories. Syntax: **cd** “<*path*>” Example: **cd** “C:FW”
copy	Copies a file from one location to another. Syntax: **copy** “<*source file name*>”, “<*destination file name*>” Example: **copy** “C:FW/pxm45_002.001.000.000_bt.fw”, “C:FW/test”
remove	Deletes a file. Syntax: **remove** “<*file name*>” Example: **remove** “test”
ll	List directory contents using long format, which includes the name, size, modification date, and modification time for each file. This command also displays the total disk space and free disk space. Syntax: **ll** [“*path*”] Example: **ll** “C:FW” **Note** When you first start a session in backup boot mode, the present working directory is a directory on a remote server as specified by the runtime software **bootchange** command. If you enter the **ll** command and the remote server is unavailable or does not exist, the switch appears to hang as the switch attempts to access the remote server. To avoid this, select a directory on the C: drive with the **cd** command first or specify a path with the **ll** command. To reboot the PXM45 card when it is searching for a remote server, press **Control-X**.
ls	List directory contents using the short format, which displays filenames, total disk space, and free disk space. Syntax: **ls** [“*path*”] Example: **ls**

Table B-1 File System Commands at Backup Boot Prompt (continued)

Command	Description
pwd	Display the present working directory. When you first start a session in backup boot mode, the present working directory is a directory on a remote server as specified by the runtime software **bootchange** command. To change to a directory on the C: drive, enter the **cd** command. Syntax: **pwd** Example: **pwd**
rename	Renames a file. Syntax: **rename** "<*old file name*>", "<*new file name*>" Example: **rename** "test", "deleteme"
whoami	Lists the login name for the current session. Since there is no user log-in procedure for backup boot mode, the username reported by the whoami command is the username configured by the runtime software **bootchange** command for remote server access. Syntax: **whoami** Example: **whoami**

Locating Software Updates

For information on locating software updates, refer to the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3*.

Transferring Software Files to and from the Switch

This section describes how to copy software files between the switch and another computer when the switch is in backup boot mode. In most cases, you will use this procedure because the switch cannot completely load the runtime software and ends start up in either backup boot mode or shell mode.

Note When the switch displays the switch prompt (which includes the switch name), copy files to the switch using the procedure described in the "Copying Software Files to the Switch" section in Appendix A, "Downloading and Installing Software Upgrades."

The Cisco MGX 8850 and the Cisco MGX 8950 switches provide a File Transfer Protocol (FTP) service to support file transfers between the switch and other computers. If you have FTP client software and network connectivity to both the switch and the server where the software files are stored, you can FTP files directly from the server to the switch. You can also use this FTP service to recover log files, boot and runtime files, or saved configuration files before replacing the hard disk.

To transfer files with the FTP service, use the following procedure.

Step 1 If you are copying software files to the switch, refer to the *Release Notes for Cisco MGX 8850 and MGX 8830 Software Version 3 (PXM45/B and PXM1E)* or the *Release Notes for Cisco MGX 8950 Software Version 3* to locate a server from which you can download the files.

Step 2 Using a workstation with FTP client software, establish connections to the server where the files are stored and to the switch.

The procedure you use for transferring the files depends on the FTP client software you are using. When initiating the FTP connection, remember the following:

- Select the switch by entering its IP address.
- When prompted for a username and password, the username for backup boot mode access is *cisco* and the password is supplied with your switch.

Step 3 For all transfers to or from the switch, select binary mode for the file transfer. The files are located in the following directories:

- PXM45 and AXSM files are in the directory C:FW.
- RPM-PR files are in the directory E:RPM.
- Log files are in the directory C:LOG.
- Configuration files are in the directory C:CNF.

Step 4 To verify that files have been transferred to the switch, use the directory commands listed in the "Browsing the File System in Backup Boot Mode" section which appears earlier in this appendix.

Clearing the Switch Configuration

To clear the entire switch configuration, use the **sysClrallcnf** command. This command clears all the provisioning data and most of the general switch configuration parameters, such as the switch name and SNMP configuration.

Initializing the PXM45 Hard Disk

If the switch troubleshooting process indicates that the PXM45 hard disk is not operating correctly, you can try to correct the problem by re initializing the hard disk as described in the following procedure.

Step 1 Establish a backup boot session on the PXM45 that connects to the affected hard disk as described in the "Changing to PXM45 Backup Boot Mode" section, which appears earlier in this chapter.

Step 2 Start a disk format by entering the **diskFormat** command as shown in the following example:

```
pxm45bkup>diskFormat "C:"
IDE: format in progress. This takes a while  ........
```

When the format is complete, a message similar to the one in the following example appears:

```
Disk format complete. Reboot the system  .....
"C:" formatted.
value = 0 = 0x0
```

Step 3 Enter the **reboot** command to restart the card.

Step 4 When the *stop auto-boot* prompt appears, press **return** to enter backup boot mode.

The following example shows the prompt and the message that appears when a newly formatted hard disk is detected.

```
Press Return key to stop auto-boot...2

To avoid reset from the Active card, use sysPxmRemove()
Use sysFWLoad() for FW download from active PXM.
*****************************************************
*    Disk does not have valid configuration.        *
*    Please run sysDiskCfgCreate(), and then reboot. *
*****************************************************
pxm45bkup>
```

Step 5 If the PXM45 you restarted is the standby card for an active PXM45 card in the same switch, enter the **sysPxmRemove** command to prevent the active card from restarting the card you are working on.

Step 6 Enter the **sysDiskCfgCreate** command to set up the PXM45 hard disk.

Step 7 If this is a standalone PXM45 card, copy the runtime and boot software files to the switch as described in the "Transferring Software Files to and from the Switch" section, which appears earlier in this appendix.

Step 8 Enter the **reboot** command to restart the card.

Step 9 If this is a standalone PXM45 card, set up the switch as if it were a new switch as described in the "Configuration Quickstart" section in Chapter 2, "Configuring General Switch Features."

If this is a standby PXM45 card, the active PXM45 card will update the newly-formatted hard disk with the active configuration. When the update is complete, the card will enter standby mode and the switch prompts you for a user name and password. Enter the user name and password to log in. After login, the switch prompt should include the letter s, indicating the card is operating in standby mode. For example:

```
pop20one.8.PXM.s >
```

Note The switch prompt might initially display the letter i for initialization. Press **Return** to display an updated switch prompt, or enter the **dspcds** command several times until the switch prompt or the **dspcds** command display shows the card is operating in standby mode. The card must complete initialization before entering standby mode.

APPENDIX C

Supporting and Using Additional CLI Access Options

The command line interface (CLI) management tool allows you to configure the Cisco MGX 8850 and Cisco MGX 8950 switches, and display the switch status. When a switch starts up for the first time, the only CLI access available is through the console port (CP). After the switch is properly configured, you can access the CLI using any of the following options:

- CP connection
- Terminal server connection
- Local LAN connection
- Dial-up connection
- ATM WAN connection

The following sections describe how to prepare the switch for the different types of CLI access and how to access the switch using these access methods.

Setting Up CP Port Connections

The Console Port (CP) connection requires no configuration on the switch. Figure C-1 shows the hardware required for a console port connection.

Figure C-1 Workstation Connection to the Console Port

The terminal you use should emulate a VT-100 terminal. You can use any personal computer or UNIX workstation and a terminal emulation program that emulates the VT-100.

The default switch configuration supports the following settings: 9600 bps, 8 data bits, no parity, 1 stop bit, no hardware flow control.

Setting Up Terminal Server Connections

A terminal server connection allows remote access to the CP port. Figure C-2 shows the hardware required for a terminal server connection.

Figure C-2 Terminal Server Connection to the Console Port

In the terminal server topology, any workstation with access to the terminal server can access the CP port as if the workstation were local. When the switch is operating properly, a terminal server connection offers no advantage over the other access methods. When the switch is not operating properly, however, other access methods might not function. In these situations, the CP port is more likely to operate than the other methods because it does not require IP connectivity to the workstation.

No special switch configuration is required to support a terminal switch configuration. The connection between the terminal server and the switch is a serial connection, which is the same as for a CP port connection. The following configuration tasks need to be completed at the terminal server:

- The serial port to the switch must be enabled and configured.
- A second interface must be defined and configured for workstation access.

The workstation interface can be any interface type that both the workstation and the terminal server support. For example, the workstation interface could be an Ethernet interface for local LAN access, or it could be a dial-in interface for remote access.

To access the switch through the terminal server, the workstation establishes a connection to the terminal server using a terminal emulation program. After connecting to the terminal server, the workstation user enters a command that selects the serial port to the switch. Once the correct port is selected, the user logs in to the switch as if the user were using a CP port connection.

Setting Up Local LAN Connections

The procedure for setting up local LAN connections is described in the "Setting the LAN or Disk IP Address" section in Chapter 2, "Configuring General Switch Features."

Setting Up Dial-Up Connections

A dial-up connection extends switch management to all workstations that have access to the Public Switched Telephone Network. Figure C-3 shows the hardware required for a dial-up connection.

Figure C-3 Hardware Required for Dial-up Connections

Before you can manage the switch using the dial-up interface, you must first assign an IP address to the maintenance port on the switch. This maintenance port is located on the PXM45 back card. For more information on physically connecting a modem to the maintenance port, refer to the *Cisco MGX 8850 Hardware Installation Guide (PXM45/B and PXM1E)* or the *Cisco MGX 8950 Hardware Installation Guide*.

To configure an IP address on the switch maintenance port, use the following procedure.

Step 1 Establish a CLI management session using a username with SUPER_GP privileges. The default user name and password for this level are *superuser*, <*superuser*>.

Step 2 Verify that the IP address is not already configured by entering the following command:

```
mgx8850a.7.PXM.a> dspipif sl0
```

Note If you omit the **sl0** option, the switch displays the configuration for all switch IP interfaces: the ATM interface (atm0), the PXM45 LAN port interface (lnPci0), and the PXM45 maintenance port interface (sl0). Note that the address for each interface must be unique.

In the IP Interface Configuration Table, look for an Internet address entry under the **sl0** entry. (You may need to press **Enter** to see this.) If an IP address is configured, you can use that address and skip the rest of this procedure. However, if the address has not been entered or is incompatible with your network, you must configure a valid IP address as described in the next step.

Step 3 To set the IP address for the maintenance port, enter the **ipifconfig** command using the following format:

```
mgx8850a.7.PXM.a> ipifconfig sl0 <IP_Addr> <netmask Mask>
```

Replace <*IP_Addr*> with the IP address you want this port to use, and replace <*Mask*> with the network mask used on this network.

Tip Cisco recommends that you use the same subnet for all IP addresses defined on all MGX 8850 switches. This simplifies router configuration.

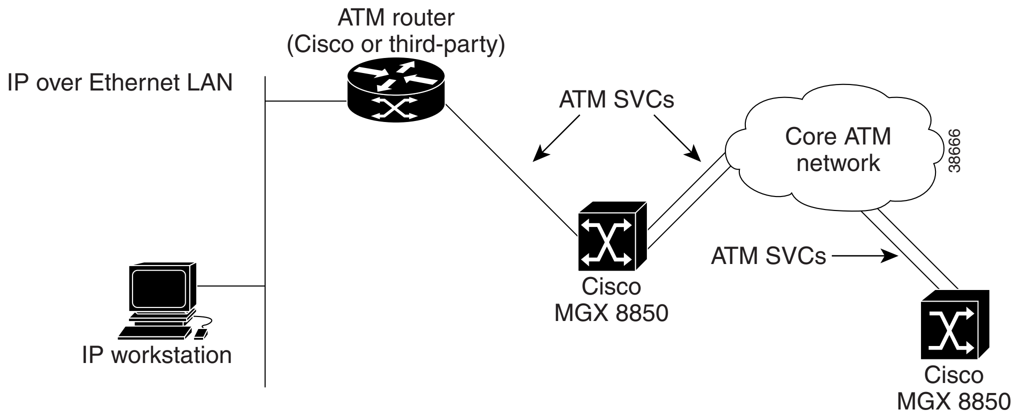
Note There are other options for the **ipifconfig** command, and you can set one or more options simultaneously. Any options you do not define in a command remain unchanged. For more information on this command, refer to *Cisco MGX 8850, MGX 8950, and MGX 8830 Command Reference (PXM45/B)*.

After you complete this procedure, the switch is ready for configuration through the maintenance port.

Setting Up ATM WAN Connections

An ATM connection extends switch management to all workstations that have access to the ATM network in which the switch is installed. Figure C-4 shows the hardware required for an ATM WAN connection.

Figure C-4 Hardware Required for an ATM WAN Connection



The workstation in Figure C-4 uses a LAN to connect to a router that supports both LAN and ATM interfaces. An IP address is assigned to an ATM interface in each Cisco MGX 8850. To manage an MGX 8850, the workstation operator configures a network management program to communicate with the IP address assigned to the ATM interface. Network managers can use the following tools to manage the switch:

- CLI using a Telnet session
- CWM
- Third-party SNMP manager

To support the ATM SVCs over which the IP traffic travels, both the router and switch are configured to map the respective IP addresses to ATM End Station Addresses (AESAs). When a management session is initiated, the IP workstation directs all communications to the IP address assigned to the ATM interface on the switch. The router encapsulates this IP traffic in ATM cells and forwards it over SVCs to the switch. The destination switch retrieves the IP messages from the ATM cells and forwards them to the internal IP management tools. Replies to the workstation follow the same path in reverse.

This feature provides maximum flexibility for switch management. Any workstation with a connection to a properly configured ATM router can manage any switch in the network. Furthermore, additional routers connected to other switches can be configured to support this feature, enabling switch configuration from multiple locations throughout an ATM network.

Configuring the Switch

To support IP connectivity over the ATM interface, you need to do the following tasks:

1. Assign an IP address to the ATM interface.
2. Assign an AESA to the ATM interface.
3. Define an AESA for every adjacent router that supports IP communications to the ATM interface.
4. Configure ATM communications between the switch and the router.

To configure the switch to support IP connectivity to the ATM interface, use the following procedure.

Step 1 Establish a CLI management session using a username with SUPER_GP privileges. The default user name and password for this level are *superuser*, <*superuser*>.

Step 2 Verify that the IP address for the ATM interface is not already configured by entering the following command:

```
mgx8850a.7.PXM.a> dspipif atm0
```

Note If you omit the **atm0** option, the switch displays the configuration for all switch IP interfaces: the ATM interface (atm0), the PXM45 LAN port interface (lnPci0), and the PXM45 maintenance port interface (sl0). Note that the address for each interface must be unique.

In the IP Interface Configuration Table, look for an Internet address entry under the atm entry. If an IP address is configured, you can use that address. However, if the address has not been entered or is incompatible with your network, you must configure a valid IP address as described in the next step.

Step 3 To set the switch IP address for the ATM interface, enter the **ipifconfig** command using the following format:

```
mgx8850a.7.PXM.a> ipifconfig atm0 <IP_Addr> <netmask Mask>
```

Replace <*IP_Addr*> with the IP address you want this port to use, and replace <*Mask*> with the network mask used on this network.

Note Use a subnet mask that is different from the network mask used for LAN port communications. If you use the same subnet for both ATM and LAN port communications, there will be two entries for the same subnet in the routing table and all egress IP communications will take place through the atm0 port.

Tip Cisco recommends that you use the same subnet for all atm0 IP addresses defined on all Cisco MGX 8850 and Cisco MGX 8950 switches. This practice simplifies router configuration.

Note There are other options for the **ipifconfig** command, and you can set one or more options simultaneously. Any options you do not define in a command remain unchanged. For more information on this command, refer to *Cisco MGX 8850, MGX 8950, and MGX 8830 Command Reference (PXM45/B)*.

Step 4 To verify the IP address you configured, enter the following command:

```
mgx8850a.7.PXM.a> dspipif atm0
```

Step 5 Make a note of the IP address defined for the atm0 interface. This is the IP address switch administrators must use to manage the switch.

Tip You can view the IP routing table for the switch by entering the **routeShow** command. To manage routes in the routing table, you can use the following commands: **routeAdd**, **routeDelete**, **routeNetAdd**, and **routestatShow**.

Step 6 Configure the switch AESA for IP connectivity by entering the following command:

```
mgx8850a.7.PXM.a> svcifconfig atm0 local <ATM_Addr>
```

Replace *ATM_Addr* with the AESA for the interface. This address must conform to the address plan for the switch.

Step 7 Define the AESA for the ATM router by entering the following command:

```
mgx8850a.7.PXM.a> svcifconfig atm0 router <ATM_Addr>
```

Replace <*ATM_Addr*> with the AESA for the interface. This address must conform to the address plan for the switch.

Step 8 To verify the ATM addresses you configured, enter the following command:

```
mgx8850a.7.PXM.a> dspsvcif
```

Step 9 If you have not already done so, configure the PNNI controller as described in the "Adding the PNNI Controller" section in Chapter 2, "Configuring General Switch Features."

Step 10 Configure the ATM line to the ATM router as described in the "MPLS and PNNI UNI Port Configuration Quickstart" section in Chapter 6, "Provisioning AXSM Communication Links."

The line configuration should specify a UNI port, SCT 6, and a partition that supports at least 20 connections.

Step 11 To verify connectivity to directly attached ATM routers, enter the **dsppnsysaddr** command.

The ATM addresses of directly attached ATM routers should appear in the list the switch displays. To display an ATM address for a remote router, you need to establish a CLI session on the remote switch and enter the **dsppnsysaddr** command.

Step 12 To check the status of ports leading to directly-attached ATM routers, enter the **dsppnports** command.

The following example shows commands that you can use to configure an MGX 8850 for IP communications over ATM.

Example C-1 Switch Commands for IP Communications over ATM

```
mgx8850a.7.PXM.a> ipifconfig atm0 A.B.E.F    # Replace A.B.E.F with IP Address
mgx8850a.7.PXM.a> svcifconfig atm0 local
47.0091.8100.0000.0010.7b65.f258.0010.7b65.1111.01
mgx8850a.7.PXM.a> svcifconfig atm0 router
47.0091.8100.0000.0010.7b65.f258.0010.7b65.ffff.f1
mgx8850a.7.PXM.a> addcontroller 2 i 2 7 #if controller does not already exist
mgx8850a.10.AXSM.a > cnfcdsct 6
mgx8850a.10.AXSM.a > upln 1.1
mgx8850a.10.AXSM.a > addport 1 1.1 96000 96000 6 1
mgx8850a.10.AXSM.a > addpart 1 1 2 500000 500000 500000 500000 1 20 32 52 1 20
mgx8850a.10.AXSM.a > upport 1
mgx8850a.10.AXSM.a > cnfilmi -if 1 -id 1 -ilmi 1 -vpi 0 -vci 16 -trap 1 -s 10 -t 10 -k 10
#Optional. This command configures ILMI for the port.
mgx8850a.7.PXM.a> addaddr 10:1.1:1 47.0091.8100.0000.0010.7b65.f258.0010.7b65. ffff.f1 160
#Enter only at switch with direct connection to router. Omit if using ILMI.
mgx8850a.7.PXM.a> dsppnsysaddr

(example output)
47.0091.8100.0000.0010.7b65.f258.0010.7b65.ffff/152
Type:      uni     Port id:   17111041
```

```
mgx8850a.7.PXM.a> dsppnports

(example output)
Per-port status summary

PortId         IF status         Admin status       ILMI state       Total Activeconns

10:1.1:1        up                up                 Undefined        3
```

Configuring the Router

To support IP over ATM communications on the ATM router, you need to configure the following interfaces:

- ATM interface to switch
- Interface to the LAN that hosts the management workstation

To configure the ATM interface to the switch, you need to do the following tasks:

- Create an ATM interface
- Assign an IP address to the ATM interface
- Assign an AESA to the ATM interface
- Configure the ATM interface to be the ATMARP server for the switch

If the router IP address for the ATM interface is on the same subnet as the IP address on the switch ATM interface, no additional configuration is required for the router IP LAN interface.

To configure the IP interface to the LAN, you need to do the following tasks:

- If the router IP address for the ATM interface is not on the same subnet as the IP address on the switch ATM interface, you must manually configure on IP host-route for each MGX 8850 to which the interface will connect.
- Configure a routing protocol to broadcast the switch IP addresses to the LAN or create default routes to the switch on the management workstation.

The procedure you use to configure the ATM router will depend on the router you are using. The following example lists commands you can use on a Cisco router to support IP over ATM communications with the Cisco MGX 8850 and Cisco MGX 8950 switches.

Example C-2 Router Configuration Commands for IP Communications over ATM

```
config term
ip routing
ip route 0.0.0.0 0.0.0.0 W.X.Y.Z 1 (set default route)
interface atm 0
ip address A.B.C.D G.H.I.J   # G.H.I.J = netmask
atm nsap-address 47.0091.8100.0000.0010.7b65.f258.0010.7b65.ffff.f1
atm uni-version 3.1
atm pvc 1 0 5 qsaal
atm pvc 2 0 16 ilmi #Optional. Enter to enable ILMI.
atm ilmi-keepalive 10 #Optional. Enter to configure ILMI.
atm esi-address 00107B65FFFF.F1 #Optional. Enter to support ILMI.
atm arp-server self
no shut
^Z
write memory
```

Starting a CLI Management Session Using a CP Port or Terminal Server Connection

The process for starting a CLI management session is similar for both CP port and terminal server connections. Both use a serial connection to the switch. The difference is that terminal server connections require that you first select the correct port at the terminal server.

After switch initialization, you can terminate and start sessions at any time using the terminal or workstation connection to the CP port or terminal server.

To start a CLI management session for CP port and terminal server connections, use the following procedure.

Step 1 Turn on the terminal or start the terminal session.

For instructions on preparing the terminal and the connection, refer to the procedure in the previous section.

Step 2 If you are accessing the switch through a terminal server, enter the commands that allow you to select the serial port that leads to the switch. The following example shows the commands that accomplish this on a Cisco 2509-RJ Router.

```
User Access Verification

Password:
router>telnet 10.1.1.1 2001
Trying 10.1.1.1, 2001 ... Open

Login:
```

In the example above, the user first logs into the terminal server and then establishes a Telnet session to the terminal server using port 2001. All workstation communications pass through the Telnet server on the terminal server and out the serial connection designated by port 2001.

Note The built-in Telnet server on the switch, which is used by the other access methods, is not used for this type of connection.

Step 3 If the Login prompt does not appear, press **Return**. The Login prompt comes from the switch and indicates that the terminal has successfully connected to the switch.

Step 4 When the Login prompt appears, enter the login name supplied with your switch, and then enter the password for that login name. For example:

```
Login: superuser
password:

pop20one.7.PXM.a >
```

The switch does not display the password during login. When login is complete, the switch prompt appears. You have established a CLI management session, and you are ready to begin switch configuration and monitoring.

Starting a CLI Telnet Session

Start a CLI Telnet session when you start a CLI management session using any of the following access methods, all of which require an IP address:

- Local LAN connection
- Dial-up connection
- ATM WAN connection

The switch includes a Telnet server process that you can use to connect to and manage the switch. Before you can establish a CLI Telnet session, you must set up the hardware for your access method and configure the switch as described earlier in the appendix.

After the appropriate interface has been configured and a physical path established to the MGX 8850, you can start a CLI session using a workstation with a Telnet client program and the switch IP address. To establish a CLI management session, use the following procedure.

Step 1 If you are dialing into the switch, establish a dial-up connection to the switch.

You will need the telephone number for the line connected to the modem at the switch. For instructions on establishing the connection to the switch, refer to the documentation for the workstation and modem.

Step 2 When the workstation has a path to the switch, start the Telnet program with a command similar to the following:

```
C:>telnet <ipaddress>
```

Replace <*ipaddress*> with the IP address assigned to the switch. If the switch is configured to support multiple access methods, be sure to use the correct IP address for the access method you are using. For example, if you are using the local LAN access method, use the IP address configured for the lnPCI0 interface.

Note The Telnet program on your workstation may require a different startup and connection procedure. For instructions on operating your Telnet program, refer to the documentation for that product.

Step 3 If the Login prompt does not appear, press **Enter**.

The Login prompt comes from the switch and indicates that the workstation has successfully connected to the switch.

Step 4 When the Login prompt appears, enter the user name provided with your switch and press **Enter**.

Step 5 When the password prompt appears, enter the password provided with your switch and press **Enter**.

After you successfully log in, a prompt appears that is similar to the one in the following example:

```
mgx8850a.7.PXM.a >
```

The switch does not display the password during login. When the login is complete, the switch prompt appears, you have established a CLI management session, and you are ready to begin switch configuration and monitoring.

Ending a CLI Management Session

CLI management sessions automatically terminate after the configured idle time. The default idle time is 600 seconds (10 minutes) and can be changed with the **timeout** command. To end a CLI management session, enter the **bye** command.

Note This command ends the CLI session. It does not terminate the connection to the switch. For example, the **bye** command does not terminate a dial-up connection, a terminal server connection, a local LAN connection, or an ATM WAN connection. The connection remains in place until you terminate it using the terminal emulation software or Telnet client software. Some client software packages include commands to terminate the connection, and most client software packages close connections when you quit the program.

If you have not terminated the connection after entering the **bye** command, you can restart a CLI management session by pressing **Return**. After you press **Return**, the switch will prompt you for a username and password.

APPENDIX D

Standards Compliance

This appendix lists the relevant technical and compliance specifications for the Cisco MGX 8850 Release 3 PXM45 and PXM1E based PNNI controllers, PNNI, and ATM switched virtual circuits in the following sections:

- PNNI Compliance
- ATM Signaling Compliance
- Processor Switching Module Specifications
- UNI 4.0
- AINI 3.0 and 3.1

Note This appendix is <u>not</u> a comprehensive list of all the standards that are supported on the Cisco MGX 8850 Release 3 PXM45 and PXM1E based switch. To verify the support of a specific standard that is not listed in this appendix, please contact your Cisco account representative.

PNNI Compliance

The PXM45 and PXM1E based PNNI routing software was designed to be compliant with **1** below. The software supports robust topology convergence, dynamic and QoS based routing in hierarchical ATM networks with scalability from small to very large networks.

Other specifications to which the PNNI routing conforms are as follows:

1. ATM Forum, “PNNI Specification Version 1.0,” af-pnni-0055.000, March 1996
2. ATM Forum, “PNNI V1.0 Errata and PICS,” af-pnni-0081.000, March 1997
3. ATM Forum, “Interim Inter-switch Signaling Protocol (IISP) Specification Version 1.0,” af-pnni-0026.000, December 1994
4. AINI
5. PNNI v2.0 draft
6. Path and Connection Trace

ATM Signaling Compliance

The following ATM Forum signaling specifications are supported:

- UNI 3.0/3.1 Signaling
- IISP Signaling
- PNNI Signaling
- ATM Signaling Interworking

Note ITU recommendations for B-ISDN DSS2 signaling is not currently supported.

UNI 3.0/3.1 Signaling

UNI 3.x signaling is supported.

Table D-1 UNI 3.x Signaling

Capability	Reference	Network Equipment Mandatory/Optional	Support
Point-to-Point calls	5.5	M	x
Address Registration	5.8	—	x
Sub-addressing	5.4.5.12, 14	—	x
B-LLI Negotiation	Annex C	M	x
AAL Parameter Negotiation	Annex F	M	x

UNI 4.0 Signaling

UNI 4.0 signaling is supported.

IISP Signaling

IISP 1.0 signaling is supported, including transport of SPVC IEs over an IISP trunk.

PNNI Signaling

PNNI signaling is supported,

Table D-2 PNNI Signaling

Capability	Reference	Network Equipment Mandatory//Optional	Support
Point-to-Point calls	6.5.2	M	x
Associated signaling	6.5.2.2.1	O	x
Non-associated signaling	6.5.2.2.2	O	x
ATM Parameter Negotiation	6.5.2.3.4	O	—
QoS Parameter Selection	6.5.2.3.5	O	x
ABR Signaling	6.5.2.3.6	O	x
Switched Virtual Path	6.5.2.2.2.2	O	x
Crankback	8. Annex B	M	x
Soft PVPC and PVCC	9. Annex C	O	x
SPVC Any VCCI value	9.2.3.1	O	
Generic Identifier Transport	6.4.5.31	O	x
Frame Discard	—	O	x

In addition to the above, the following PNNI 2.0 capabilities are supported on an interface.

Table D-3 PNNI 2.0 Interface Capabilities

Capability	Reference	Network Equipment Mandatory//Optional	Support
Connection Tracing	6.7	—	x
Path Tracing	6.7	—	x

ATM Signaling Interworking

Interworking between all combinations of signaling protocol is supported at all interfaces types: UNI to UNI, UNI to NNI and NNI to NNI.

Table D-4 ATM Signaling Interworking

Protocol	UNI 3.0	UNI 3.1	UNI 4.0	IISP 1.0	PNNI 1.0	AINI 3.0	AINI 3.1
UNI 3.0/3.1	x	x	x	x	x	x	x
UNI 4.0	x	x	x	x	x	x	x
IISP 1.0	x	x	x	x	x	x	x
PNNI 1.0	x	x	x	x	x	x	x
AINI 3.0	x	x	x	x	x	x	x
AINI 3.1	x	x	x	x	x	x	x

SONET/SDH

The standards and responsible organizations with which MGX 8850 SONET technology complies are as follows:

- Bell Communications Research–SONET Transport Systems: Common Generic Criteria, GR-253-CORE, Issue 2, 1995.
- ITU Recommendation G.782–Types and General Characteristics of Synchronous Digital Hierarchy (SDH) Equipment, January 1994.
- ITU Recommendation G.783–Characteristics of Synchronous Digital Hierarchy (SDH) Equipment Functional Blocks, January 1994.
- ITU Recommendation G.832–Transport of SDH Elements on PDH Networks: Frame and Multiplexing Structures, November 1993.
- ITU Recommendation G.958–Digital Line Systems based on the Synchronous Digital Hierarchy for use on Optical Fibre Cables, November 1994.
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GLOSSARY

A

ABR Available bit rate is a Class of Service defined for ATM connections by the ATM Forum. Devices using ABR are guaranteed no more than a certain rate of throughput. This rate dynamically changes and the current value is relayed to the sending device by way of Resource Management (RM) cells.

ACR Available cell rate.

AESA ATM End Station Address. The 19-octet address that uniquely identifies each logical node.

AINI ATM Inter-Network Interface.

Annex G A bidirectional protocol, defined in Recommendation Q.2931, used for monitoring the status of connections across an UNI interface. The BPX SES PNNI controller uses the Annex G protocol to pass connection status information between a itself and the BPX 8600 switch.

APS Automatic Protection Switching.

ATM Asynchronous Transfer Mode.

AW Administration Weight.

AXSM ATM Switch Service Module.

AXSM/B Newer version of the AXSM card. Provides better support for APS line switching.

AXSM-E AXSM Enhanced card. Provides more traffic policing and statistics features than AXSM and AXSM/B.

B

BITS Building Integrated Timing System.

C

CBR Constant bit rate is used by a connection that requests a static amount of bandwidth, for continuous availability during the connection lifetime.

CDV Cell Delay Variation.

Cisco IOS Cisco Internet Operating System.

Class of Service (CoS) Buffer A buffer or queue which serves connections with similar QoS requirements.

Class of Service (CoS) Buffer Descriptor Template A component of a Service Class Template which contains Class of Service Buffer configurations indexed by CoSB number.

CLI Command Line Interface.

Community In the context of SNMP, a relationship between an agent and a set of SNMP managers that defines security characteristics. The community concept is a local one. defined at the agent. The agent establishes one community for each desired combination of authentication, access control, and proxy characteristics. Each community is given a unique (within this agent) community name, and the management stations within that community are provided with and must employ the community name in all get and set operations. The agent may establish a number of communities, with overlapping management station membership.

CP Console Port. The console port is a serial port on a PXM45 UI-S3 back card. This is the port used to initialize the switch. This port is also used for CLI management after initialization.

CPE Customer Premise Equipment.

cps Cells per second.

CTD Cell Transfer Delay.

D

DCC Data Country Code.

DSL Digital Subscriber Link.

DSLAM Digital Subscriber Line Access Multiplexer.

DTL Designated Transit List.

E

Enterprise MIB A MIB module defined in the enterprise-specific portion of the Internet management space.

F

Feeder A Feeder is a small switch which acts as an extension shelf, typically with lower-bandwidth interfaces, for a larger switch. The larger switch is referred to as the Routing Node for the Feeder(s).

I

ICD International Code Designator.

ID Abbreviation for identification.

IISP Interim Inter-switch Protocol.

ILMI Integrated Local Management Interface.

IOS Cisco Internet Operating System.

IP Internet Protocol.

L

LCN Each interface card in a switch has a certain number of Logical Connection Numbers. A Logical Connection Number is used for each cross connect leg through the card in question. "LCN" is often roughly synonymous with "cross connect leg". In VSI terminology, and LCN is an example of an Other End Reference.

LER Label Edge Router.

LGN Logical Group Node.

Logical Interface Each physical interface and every virtual trunk endpoint on a platform is represented to the VSI Controllers as a different Logical Interface with partitions, and other VSI configuration. Logical Interface numbers are 32-bit with a format which is, in general, known only to the platform.

Logical Link Either a physical link or a VPC PVC across another ATM network. Logical links are referred to as horizontal links (if connecting logical nodes within a pair) or outside links (if connecting peer groups).

LSC Label Switch Controller.

M

Managed device A device containing a network management agent implementation.

MBS Maximum Burst Size.

MIB Management Information Base, a structured set of data variables, called objects, in which each variable represents some resource to be managed.

MIB-II Internet-standard MIB, RFC 1213.

MP Maintenance Port. The maintenance port is a serial port on a PXM45 UI-S3 back card. This is the port used for dial-up CLI management.

MPG Multiple Peer Group.

MPLS Multiple Protocol Label Switching.

N

nrtVBR	Non-real-time-variable-bit-rate is intended for non-real-time application that have bursty traffic characteristics, and which are characterized in terms of a PCR, SCR, and MBS.
NSAP	Network Service Access Point.
NIC	Network Interface Card. An ATM card for a host or router is an ATM NIC.
NNI	Network-to-network interface.

O

Object	In the context of SNMP, a data variable that represents some resource or other aspect of a managed device.
Object type	Defines a particular kind of managed object. The definition of an object type is therefore a syntactic description.

P

PCR	Peak Cell Rate.
PGL	Peer Group Leader.
PNNI	Private Network-to-Network Interface.
PNNI RCC	PNNI routing control channel. See RCC.
Port	A port is a connector on the switch to which a communications line can attach. When an ATM interface is defined for an AXSM port, the ATM interface can be called an ATM interface or ATM port.
PTSE	PNNI Topology State Element.
PXM	Processor Switch Module. Also refers to the PXM and PXM1 cards that control MGX 8230, 8250 and 8850 Release 1 switches.
PXM45	Processor Switch Module card that operates at 45 Gbps. This card is designed for MGX 8850 and MGX 8950 switches.
PXM45/B	Newer version of the PXM45 that is designed for MGX 8850 and MGX 8950 switches.

R

RCC	Routing control channel. A VCC used for the exchange of PNNI routing protocol messages.
RFC	Request For Comment.

Routing Node In tiered networks terminology, a Routing Node is a larger switch to which one or more Feeders is attached.

RPM Route Processor Module. Also refers to the RPM card that is designed for MGX 8230, MGX 8250, and MGX 8850 Release 1 switches. The RPM card is an Ethernet router that can operate as a Label Edge Router or a Label Switch Controller in an MPLS network.

RPM-PR Newer version for the RPM card that is designed for MGX 8850 and MGX 8950 switches.

rtVBR Real-time-variable-bit-rate is intended for real-time applications that require tightly constrained delay and delay variation (such as voice and video applications). rtVBR is characterized by PCR, SCR, and MBS.

S

Service Class (aka Service Type, or Service Category) A concept for grouping connections that share a common set of traffic characteristics and QoS requirements.

Service Class database The collection of data items which support the Service Class Template concept.

Service Class Template (SCT) A set of data structures which map ATM Service Types to sets of pre-configured communication parameters.

SCR Sustainable Cell Rate.

SNMP Simple Network Management Protocol.

SVC Switched Virtual Circuit.

SPVC Soft Permanent Virtual Circuit.

SPVP Soft Permanent Virtual Path.

T

TAC Technical Assistance Center.

U

UBR Unspecified Bit Rate is intended for non-real-time application, such as those that do not require tightly constrained delay and delay variation. Traffic in the UBR class is not guaranteed any particular throughput or delay performance. In this regard, UBR is similar to ‘traditional’ IP service.

UNI User-to-Network Interface.

V

VC ATM and Frame Relay traffic is carried in Virtual Channels which are set up between adjacent ATM or Frame Relay switches before data transmission occurs. An ATM link between switches may support up to 2^{28} different VCs, although a small number of VCs is reserved for special purposes.

VCC Traffic is carried end-to-end on an ATM network on Virtual Channel Connections, which consist of a sequence of Virtual Channels between switches linked by VC cross-connects at the switches.

VCI Each VC within a specific Virtual Path on a link has a unique Virtual Channel Identifier, which is a 16-bit number (see also VPCI).

VP, VPC, VPI A Virtual Path is a ‘bundle’ of 2^{16} Virtual Connections with the same Virtual Path Identifier, i.e. the first 12 bits of the VPCI. Most ATM switches can switch VPs using only a single cross-connect (instead of up to 2^{16}). An end-to-end sequence of VPs cross-connected at the intermediate switches is a Virtual Path Connection.

VPCI Each VC on a link has a unique Virtual Path and Channel Identifier, which is a 28-bit number. The VPCI consists of a 12-bit VPI concatenated with a 16-bit VCI.

X

Xbar Abbreviation for crossbar switch.

XLMI Extended Link Management Interface.

XM-60 An MGX 8950 card that provides the switching fabric for call processing.

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